

Automatic Number Plate Recognition Integration Guide

Contents

1	Introduction	3
a.	Critical Notice	3
2	General Requirements	4
a.	System Requirements.....	4
b.	License Requirements.....	4
c.	Image Requirements	4
3	Third Party Algorithms	8
a.	Requirements	8
b.	XXX engine	8
4	ANPR Cameras.....	9
a.	Supported Cameras	9
b.	ANPR Algorithm Configurations	9
c.	CathexisVision Requirements.....	9
d.	Add the Camera in CathexisVision.....	10
e.	Add the ANPR Integration Device.....	10
5	ARH Engine	12
a.	Requirements	12
b.	ARH Software.....	12
c.	License Plate Recognition Panel Setups	13
d.	Integrations Devices Panel Setups.....	19
6	Integration Devices Configuration (All).....	21
a.	Object Configuration Tab.....	21
b.	Object Properties Tab.....	23
c.	Device Events Tab.....	23
d.	Object Groups Tab.....	24
e.	General Tab	25
f.	License Plates Tab.....	27
7	Database (All)	33
a.	Navigate to the Database Tab	33
b.	Database Interface	33
8	Events (All).....	37
a.	Creating Events.....	37
b.	Creating Triggers.....	37
c.	Adding Triggers to an Event.....	38
d.	Actions	40
9	Site Optimisation (All)	41



a. Check for System Issues.....	41
b. Statistics.....	41
c. Cameras	42
d. Servers	42
d. Detectors.....	42
10 Conclusion	43

1 Introduction

This document will guide you through the process of setting up your ANPR system.¹ CathexisVision integrates with three categories of ANPR engines which require different setups. These are:

- Third party ANPR algorithms.
- ANPR Cameras.
- Built-in ANPR engines.

Third party algorithms and ANPR cameras only send through triggers to CathexisVision, while the built-in engine is fully incorporated into the CathexisVision software. At present, CathexisVision uses the AR Hungary ANPR engine.

After completing the engine-specific setups, the configuration of the ANPR integration devices, databases and CathexisVision events follows standard procedure and are dealt with in general sections, not specific to any particular application.

This document also details some site optimisations steps which can be run through in order to increase the efficiency of detection. Note, however, that some of these steps will not apply to some of the ANPR engines.

a. Critical Notice

Previously, the ANPR feature used both Parking and Free Flow engines supplied by ARH. The Parking Engine is no longer supported by the manufacturer. The Parking feature of the ANPR is now called a Triggered Solution -- as in ground loop, IR beam or less accurate VMD solution which uses the FreeFlow Engine.

Any mention of the Parking Engine in this document should be ignored.

For pre-2018 systems using the Parking feature, please see the Legacy ANPR Document for guidance.

For more information, or to request the Legacy ANPR Document, please contact support@cat.co.za.

¹ Please remember that this appnote was designed to deal specifically with the **ANPR integration**. For further information about the **CathexisVision** software, please consult the main Setup Manual or contact support@cat.co.za.

2 General Requirements

a. System Requirements

- CathesisVision 2018 and later.
- Windows 7 - 64bit and later; Windows Server 2008 R2 and later.
- Minimum of 4 GB of RAM required.

Please see the setup section relevant to your site for specific requirements for the various ANPR engines.

Note: If the user plans on installing this integration on a Linux unit, please contact support@cat.co.za.

b. License Requirements

Minimum for all ANPR application:

CLPR-2000	Integration Base License
CLPR-1001	Per Detector License

c. Image Requirements

There are a number of image conditions and settings to consider when setting up an ANPR system. These image conditions need to be taken into account before attempting to follow the rest of the set up.

Image Dimensions

1. **Latin characters** require the characters on the license plate to be at least 16 pixels high at the furthest point of capture. This is the minimum character size at the start of the set detection area.
2. **Special characters (Arabic, Chinese etc.)** will require a character height of at least 20 pixels at the furthest point of capture. This is the minimum character size at the start of the set detection area.
3. The **whole license plate** needs to be visible in the image.
4. The **language engines** are region specific. Make sure you have downloaded the correct engine for your region as different engines are able to detect different character heights and text specific to the region.

Image Quality

It is difficult to define what sort of quality is necessary since environments vary so greatly but as a general rule images should be reasonably **sharp**, have good **contrast**, under good **lighting conditions**, with a **reasonable angle of view**.

Illumination

The **most important** aspect in ANPR image quality is *illumination*. The license plates need to be well illuminated in the day, and night, for the algorithm to work reliably with a non-infrared camera.

Non-Infra-Red or visible light integrated cameras have about the same accuracy during the day as IR integrated cameras, **but** during the night non-IR integrated cameras are severely impaired, and will not pickup most plates. This is because of lack of illumination and the high image noise levels (due to increased sensitivity on the sensor).

This means that if your cameras are visible light integrated and you want to recognise license plates, colour of the plates and see the colour of the vehicle in dark areas, you will have to invest in some additional visible light illumination. Well positioned LED lighting that does not create reflections back into the camera lens or blind the driver should be used.

Angle of View/Camera Mounting

The **CathexisVision ANPR** allows for correction based on angle of view, via **Slope** and **Slant** settings, but each installation is different. When it comes to angle of view there are a few general rules to go by for all ANPR options:

- a. It is always better to view license plates from the front.
- b. The camera should not be mounted too high above passing vehicles. As a rule of thumb 30 degrees should not be surpassed. Maximum camera mounting height of 4 meters.
- c. The camera must also not be too low as to have the car headlight shining directly into the lens. This will be dependent on the slope of the site. Minimum camera mounting height of 1.5 meters.
- d. The camera should not be mounted too far to the side of passing vehicles. The rule of thumb here being 15 degrees, or less.
- e. The capture area should be as level and as straight as possible with unobstructed views of the vehicle number plates at all times with a minimum detection range of 4 meters.
- f. Avoid having vehicles turning into the capture area or going over speed reducing humps.
- g. Avoid moving shadows from vegetation within the capture area where possible.
- h. Avoid direct or reflected sunlight off the number plate back into the camera.

Frame-rate

This setting is not the frame rate of the camera. It is the setting for the built-in CathexisVision ANPR engine. This is the number of frames that the ANPR algorithm processes per second. The CathexisVision default is 5. This will suffice for speeds of up to 75kmph. Thus, if the camera frame rate is 20fps and the ANPR algorithm setting is 5fps then only every 4th frame from the camera is processed by the algorithm.

Set Framerate

Set this framerate according to the frame processing speed of the algorithm which is available in the LPR Stats. See **Help menu** → **Local server stats** → **Others** → **LPR** → **LPR**. For example, if the system can only process a frame at 200ms then the maximum frames that can be processed is 5fps.

Frame Processing Time vs Detection Time

For the CathexisVision ANPR Engine there is a difference between individual frame processing time and the detection time. Detection time is the time spent **waiting** for the captured frames to be processed which is dependent on the site installation and the ANPR engine. The individual frame processing time can remain at 200ms, but if there is a queue of frames waiting to be processed this loads the CPU delaying the result of the detection.

Note:

1. If 3 out of 5 frames are required for a valid detection then the processing delay (provided there are no queued frames for processing) is a minimum of 3 x 200ms = 600ms.
2. This setting will have the highest impact on the CPU usage of the server, so only adjust it incrementally, and when necessary.

Image Examples

Poor Image Examples



Contrast is too low.



Overexposed.



Bad lighting.



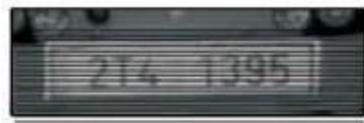
Distortion.



Low spatial resolution. The resolution of the characters is too low; it needs to be at least 16 pixels, as per the pixel heights given above.



Unfocused image.



Interlacing can cause reading issues.

Good Image Examples

The two examples below are about as perfect as one could expect. They have:

- Good character resolution.
- Are sharp.
- Have high contrast.
- The lighting is good.
- The angle of view is good.



3 Third Party Algorithms

a. Requirements

- CathexisVision 2018 and later.
- Windows 7 - 64bit and later; Windows Server 2008 R2 and later.
- Minimum of 4 GB of RAM required.

Note: If the user plans on installing this integration on a Linux unit, please contact support@cat.co.za.

License Requirements

CLPR-2000	Integration Base License
CLPR-1001	Per Detector License

b. XXX engine

Not yet implemented.

4 ANPR Cameras

CathexisVision supports a number of ANPR cameras – cameras which have embedded ANPR algorithms. CathexisVision uses the embedded algorithms to perform detections, after which the event information is databased in the CathexisVision integration database. These ANPR cameras are added to the CathexisVision system as IP cameras in the usual manner. The software then detects them as ANPR cameras and pulls through the necessary integration device information.

a. Supported Cameras

Presently, CathexisVision supports the following ANPR cameras:

- **HikVision**

Model	DS-2CD4A26FWD-IZS
Firmware Version	V5.4.5 build 170308

- **Dahua**

Model	DHI-ITC237-PW1A-IRZ
Firmware Version	2.202.0000.1.T build 2016-9-23

b. ANPR Algorithm Configurations

ANPR detection configuration for ANPR cameras is setup on the camera itself, via the camera's web interface. Please consult the camera manufacturer documentation for the latest instructions on configuring ANPR detection on the camera as well as the camera installation guidelines. The installation documents and web configuration guides for the specific ANPR camera/s are available on the CathexisVision website.²

Note: The camera and NVR time need to be synchronised for the event and video to line up correctly. An NTP client-server configuration and setup is highly recommended.

c. CathexisVision Requirements

These are requirements in CathexisVision in order to integrate the ANPR cameras.

- **CathexisVision** 2018 and later.
- Windows 7 - 64bit and later; Windows Server 2008 R2 and later.
- Minimum of 4 GB of RAM required.

Note: If the user plans on installing this integration on a Linux unit, please contact support@cat.co.za.

License Requirements

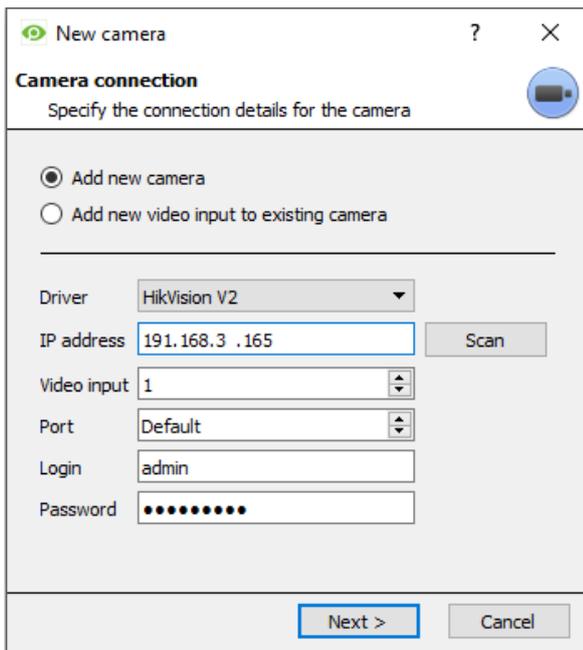
CLPR-2000 Integration Base License

² Cathexis cannot guarantee the accuracy of these documents. These documents may not be up-to-date due to firmware updates as released by the relevant manufacturers. Please consult camera manufacturer documentation directly.

d. Add the Camera in CathesisVision

Adding the ANPR camera to CathesisVision follows the same procedure as adding a general IP camera.

Setup Tab → Configure Servers → Cameras → New



Enter the camera details, and click Next to follow the addition wizard as usual.

Once added, the system immediately identifies the camera as an ANPR camera and pulls through the relevant device information.

See below for confirming that the camera is being identified correctly.

Once the camera has been added, the ANPR integration device needs to be added in the Integration Devices panel of Configure Servers. See below.

Confirm Camera Identification

To confirm that the camera is being identified correctly, consult the server statistics:

Help Menu → Local Server Stats → Network Server → Devices → List → Camera → Section 2 → General.

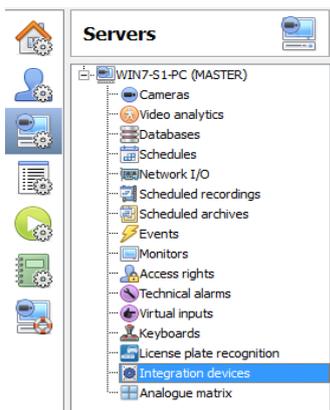
If the camera is an ANPR camera, it will reflect **Yes** in the LPR column.

Choose the video stream resolution and setup for a minimum license plate width in the image of 190 pixels.

e. Add the ANPR Integration Device

Here you configure the way that **CathesisVision** reads the information being sent from the ANPR camera.

Setup Tab → Configure Servers → Integration Devices



You will notice two sections in this window, **Devices** and **Configuration**. These will be dealt with individually.

- *Devices*

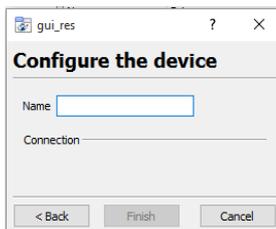
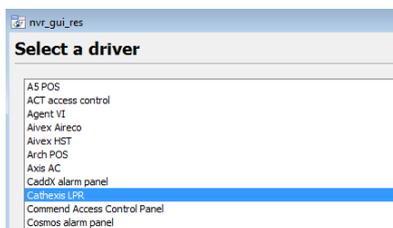
The **Devices** section lists the integration devices attached to your integration database.

WIN7-S1-PC - Integration devices

Devices	
Name	Driver
lpr	Cathexis LPR

Add New Devices

1. Click .
2. Select **Cathexis LPR** from the list.
3. Give your device a descriptive **name**.



Your device will now appear in the list. Select it to bring up the **Configuration** options. See the **Integration Devices Configuration** section.

5 ARH Engine

This section will detail the procedure for setting up the ARH ANPR system to integrate with CathexisVision. After installing the relevant drivers, configuring your **CathexisVision** software to detect license plates is a two-step process. See the next section.

a. Requirements

- **CathexisVision** 2018 and later.
- Windows 7 - 64bit and later; Windows Server 2008 R2 and later.
- Minimum of 4 GB of RAM required.
- **ARH Hungary FreeFlow** dongle.
- **ARH Hungary** region-specific language engine (should you need it).

Note: If the user plans on installing this integration on a Linux unit, please contact support@cat.co.za.

License Requirements

CLPR-2000	Integration Base License
CLPR-1001	Per Detector base License

b. ARH Software

You need to install the **ARH ANPR software**, and, if it is required, the **ARH language engines** as well.

• *Installing ARH Software*

1. Navigate to the ANPR software download page of the Cathexis website. You can find it at <http://downloads.cathexisvideo.com/software/anpr-software/>
2. Download the **FreeFlow** setup files. Alternatively download the Zip folder which contains all necessary files.
3. Extract the *.zip* folder and run the *setup.exe* file.
4. Select the “full install” option where possible.
5. Plug the dongle into the USB port on the recording server.
6. Reboot the recording server.

Note: All previous versions of the ARH software (Carmen) must be first fully uninstalled if this is a re-install or update.

• *Installing Language Engines*

The language engine will allow the **CathexisVision** interface to recognize different language characters on the license plates. The default language is set to English (latin_general), but you can install additional engines. If you require your unit to recognize license plate characters other than English, please do the following.

1. Navigate to the ANPR software download page of the Cathexis website. You can find it at <http://downloads.cathexisvideo.com/software/anpr-software/>
2. Download the desired language engine.
3. Navigate: **Start Menu → All Programs → CARMEN GX → Engine Manager**
4. Run the Engine manager

5. Once the **Engine Manger** is running click "Browse" (next to Engine(s) packages), and navigate to the **Carmen** engine file and click **Open**. The engine will now appear under "**Found engines**".
6. Click on **Install engines** and the new engine will now appear in the **Installed Engines**.
7. Restart the Recording Server.

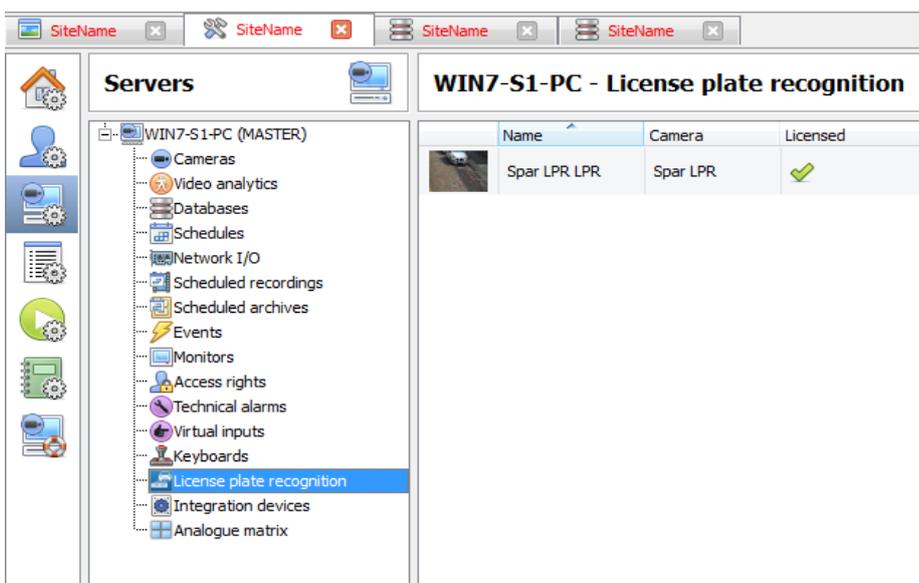
To check if the language engine installation was successful, open **CathexisVision software** → **Setup tab** → **Configure Servers** → **License Plate Recognition**.

At the bottom of the screen you should be able to select your language engine of choice. If this option is not presented, either run the process again or contact support@cat.co.za.

c. License Plate Recognition Panel Setups

Here you will configure how the camera reads license plates. This involves defining the areas of detection and configuring the FreeFlow and Triggered Drivers.

Navigate: **Setup Tab** → **Configure Servers** → **License Plate Recognition**.



Once set up, all your ANPR cameras will appear here.

Select **New** to add an ANPR camera, or **Edit** to edit an existing ANPR camera. **These windows are identical.**

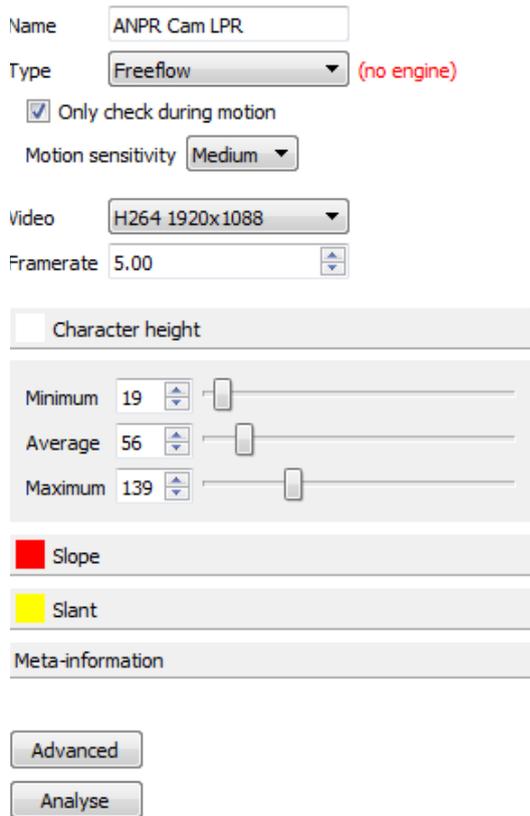
Once the add/edit window is open, you will have to choose between the two ANPR applications; **FreeFlow** and **Triggered**.

Note:

1. License plate character heights of between 15 – 20 pixels will generally be recognised, but character heights of greater than 20 pixels but less than 200 pixels are preferred. Note that images with a pixel height greater than 200 may be too large to detect.
2. When selecting the Triggered application, select the "Use the FreeFlow algorithm" check box in the **Advanced** setting section. See below.

FreeFlow

FreeFlow is typically used to identify the license plates of moving vehicles. This would be used on road-view cameras. **FreeFlow** can be used for a triggered/parking type application where the lane count is very high and multiple detectors are required.



Name your algorithm.

Select the **type** of ANPR application. Here you will choose between **FreeFlow** and **Triggered**

Note: If the Triggered application of the ANPR is selected then in the advanced setting the FreeFlow engine must be selected.

Selecting Only check during motion will not capture the license plates of stationary vehicles.

Select the desired **Motion Sensitivity**. Check the % statistics for "frames with licenses". The higher the % the quicker the detection.

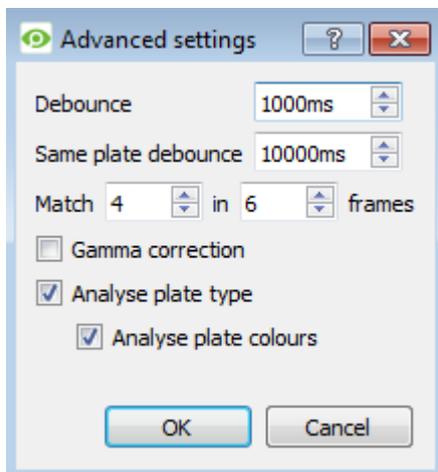
Select the resolution of **Video** feed you want the algorithm to analyse.

Select the desired **Framerate**. Select the desired **Framerate**. (5 fps is recommended for speeds of up to 75kmph).

Set the desired **Character Height**, **Slope** and **Slant**. Explained below.

To test the algorithm, click if there is a vehicle with a visible number plate in the image. The algorithm's confidence level will be shown as % in brackets.

Advanced



Debounce: If a license plate is detected less than the defined number of milliseconds (ms) after the previous detection it is discarded.

Same plate debounce: If the same license plate is detected in consecutive detections then it is discarded if it is less than the defined number of ms since the first detection. This is useful to prevent consecutive triggering of the same event.

Match x in y frames: For a license plate detection to occur, the system needs to find the same license plate in x of y frames. In this example, the license plate needs to be identified correctly at least four times in six frames. This provides a level of confidence in the detected license plate. If plates are persistently misread this is a good setting to change.

Gamma correction is used to correct images with contrast issues.

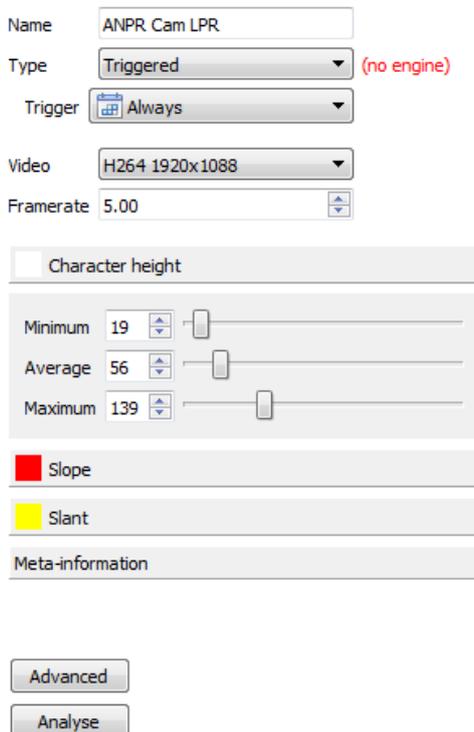
Analyse Plate Type and Colours: This is important for regions where license plate types and colours are used as identifiers. For example, a government license plate.

Triggered

Triggered mode is used in a parking environment to identify license plates on stationary vehicles. This would be used in parking lots, or similar.

Recommendation:

It is recommended that a triggering input -- such as a ground loop or IR beam across the road -- is used. This is because if a motion trigger is used, the percentage of frames without license plates which are presented for processing places an extra load on the CPU and delays the processing of valid frames.



The screenshot shows the ANPR configuration interface. It includes the following fields and controls:

- Name:** ANPR Cam LPR
- Type:** Triggered (no engine)
- Trigger:** Always
- Video:** H264 1920x1088
- Framerate:** 5.00
- Character height:** Minimum: 19, Average: 56, Maximum: 139
- Slope:** (indicated by a red square)
- Slant:** (indicated by a yellow square)
- Meta-information:** (empty field)
- Buttons:** Advanced, Analyse

Name your device.

Select the **type** of ANPR application. Here you will choose between **FreeFlow** and **Triggered**.

Note: If the Triggered application of the ANPR is selected then in the advanced setting the FreeFlow engine must be selected.

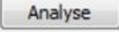
Select your **Trigger**. This could be on IO input trigger from a loop in the road or an IR beam across the road.

Select the type of **Video** feed.

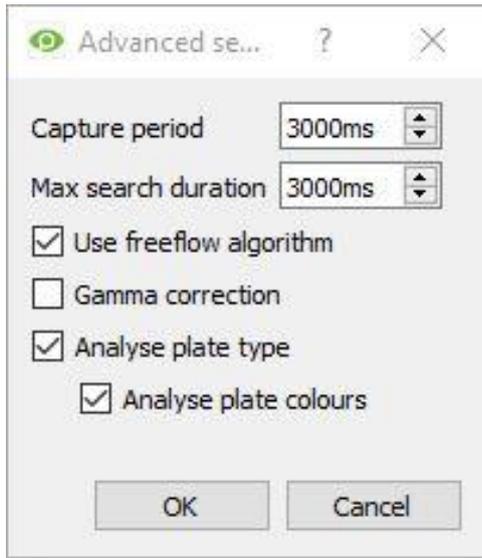
Select the **Framerate**.

Select the desired **Framerate**. Select the desired **Framerate**. (5 fps is recommended for speeds of up to 75kmph).

Set the desired **Character Height**, **Slope** and **Slant**. Explained [below](#).

To test the algorithm, click  if there is a vehicle with a visible number plate in the image. The algorithm's confidence level will be shown as % in brackets.

Advanced



Capture period defines how much video to process for a trigger.

Max search duration is the maximum time the system will search the given video to find a license plate.

Use FreeFlow algorithm - This setting makes it possible to use a **FreeFlow** algorithm in the Triggered or parking environment.

Gamma correction is used to correct images with contrast issues.

Analyse Plate Type and Colours: This is important for regions where license plate types and colours are used as identifiers. For example, a government license plate.

Area of Analysis

Left-clicking on **Character Height**, **Slope**, and **Slant** will expand the options for each settings group. Do so for each setting.

Character Height

License plate characters need to be a specific height (minimum 16 pixels) so that the software can read them.



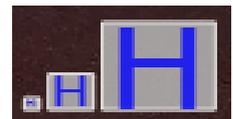
Set the **Minimum** character height to the size of the smallest license plate characters to be captured on your camera – when the vehicle enters the detection zone

Set the **Average** height to the average size of the license plate characters captured by your camera – middle of the detection zone.

Set the **Maximum** height to the size of the largest license plate characters captured by your camera – exit of detection zone.

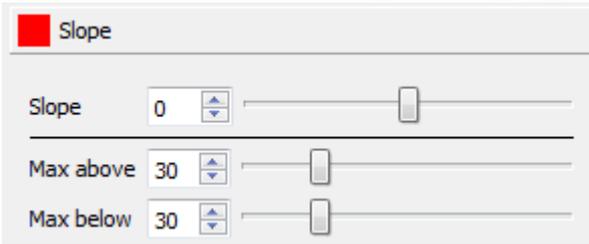
Tip:

Line up the boxes with the license plate characters for a visual representation of the **Minimum**, **Average** and **Maximum** character height values. The sizes of the boxes will change as you increase/decrease the values. For best results a character height of greater than 20 pixels is preferred, though between 15 – 20 pixels is also acceptable.



Slope

Slope defines the slope of the surface the vehicles are on.



Slope: The horizontal angle of license plate.

Max Above/Below: Define the angle of the slope.

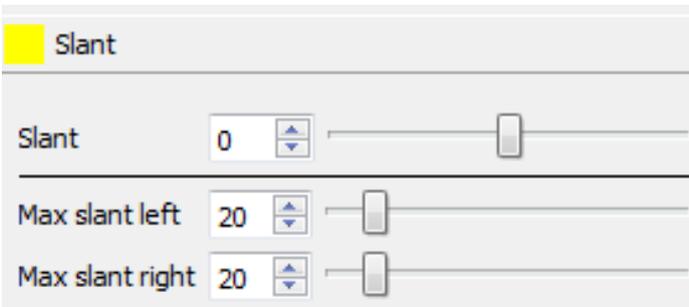
Tip:

Match the horizontal line under the characters to the bottom of the license plate, and then adjust the slope as needed using **Slope**, **Max above** and **Max below**.



Slant

Slant defines the slant of the license plate. This is the angle of view that the license plates appear on the camera.



Slant: The vertical angle of the license plate.

Max slant left/Max slant right: Define the angle of the slant.

Tip:

Match the vertical line with the side of the license plate slant as needed using **Slant**, **Max slant left** and **Max slant right**.



Editing the Areas of Analysis

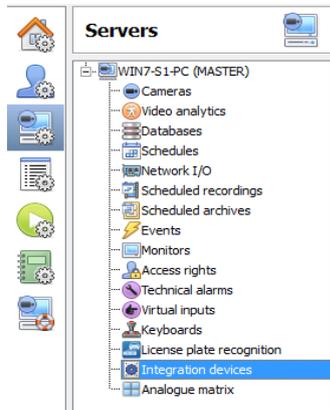


1. Select the overlay zone to bring up the control points
2. Click-and-drag them to change the shape of the zone.
3. Hold CTRL and click on a line to add a new control point.
4. Double click on a control point to remove it.
5. Keep it as small as possible as this will reduce the search detection time for images where no plate is detected.
6. Check a LPR detection on the entry and exit of the zone once configured.

d. Integrations Devices Panel Setups

Here you configure the way that **CathexisVision** reads the information set up in the **License Plate Recognition** panel.

Setup Tab → Configure Servers → Integration Devices



You will notice two sections in this window, **Devices** and **Configuration**. These will be dealt with individually.

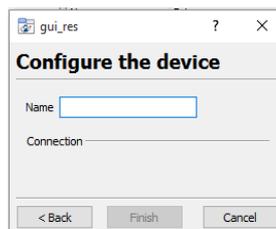
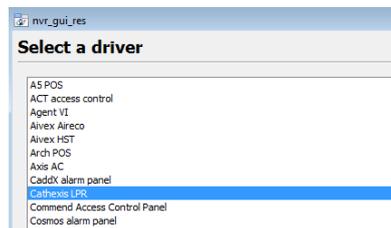
Devices

The **Devices** section lists the integration devices attached to your integration database.

WIN7-S1-PC - Integration devices	
Devices	
Name	Driver
lpr	Cathexis LPR

Add New Devices

- Click .
- Select **Cathexis LPR** from the list.
- Give your device a descriptive **name**.



Your device will now appear in the list. Select it to bring up the **Configuration** options. See the **Integration Devices Configuration** section.

6 Integration Devices Configuration (All)

This section deals with the configuration of the ANPR integration devices, all of which follow the same procedures.

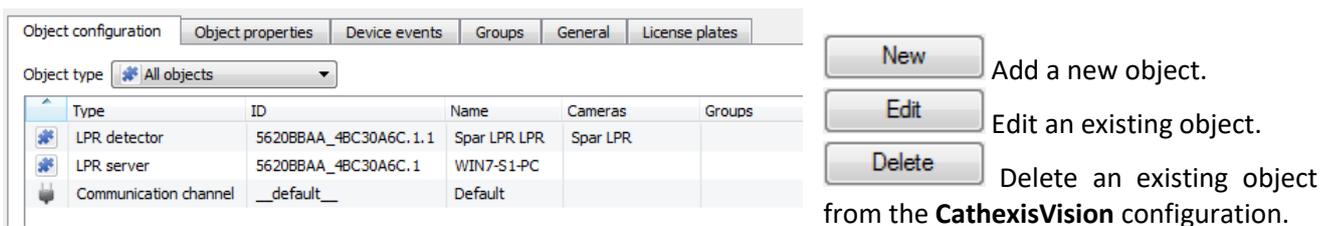
The **Configuration** section enables you to edit/review the device. Select the newly added device in the above section to bring up configuration options, which are divided up into a number of tabs:

1. **Object configuration.**
2. **Object properties.**
3. **Device events.**
4. **Groups.**
5. **General.**

a. Object Configuration Tab

The **Object Configuration** tab allows you to view all the individual objects that comprise the integration.

Object Configuration Buttons



Type	ID	Name	Cameras	Groups
LPR detector	5620BBAA_4BC30A6C.1.1	Spar LPR LPR	Spar LPR	
LPR server	5620BBAA_4BC30A6C.1	WIN7-S1-PC		
Communication channel	__default__	Default		

New Add a new object.

Edit Edit an existing object.

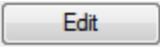
Delete Delete an existing object from the **CathexisVision** configuration.

Object Configuration Right-Click

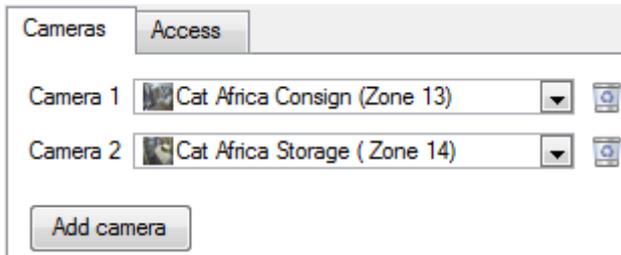
You can also accomplish much of the same goals as the configuration buttons using the right click menu. Right-clicking on an object will bring up the following options.

New...	New will open up the dialogue to add a new object.
Disable	Disable/Enable allows you to manually enable/disable individual nodes.
Delete	Delete will permanently remove this object from the list.
Properties	Properties will open up the object properties. You may edit the object from here. (Specifically, you will be able to assign cameras to this object, as well as define user access levels for it.)

Properties Window

Selecting **Properties** from the right-click menu will bring up the editing window, where you can accomplish the same goals as if you had selected . This window is also displayed in tabs.

- **Properties Window: Cameras Tab**



Adding a camera to an object will mean that, whenever there is an event on that object, the recording from that camera will be related to the time and date of the object event, in the Integration database.

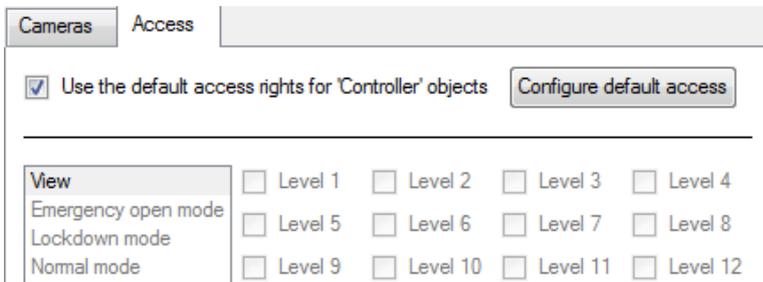
To add a camera, click on **Add camera**, and select the relevant camera from the drop-down menu.

To delete a camera, click on .

Note:

1. You may add up to 4 cameras per ANPR Detector.
2. If you do not have **continuous recording** setup on associated cameras, you will run the risk of zones (object) triggering while the cameras are not recording. To only record cameras when an object triggers, you will need to setup **Events** that trigger a recording when one of these objects is activated.

- **Properties Window: Access Tab**



Access allows you to protect sensitive objects, by only allowing certain user levels access to them.

You will see a list of objects for which you may set the access level of each.

Note: If you have *Use default access rights* checked, you must make sure that those default rights have been correctly defined. Click on **Configure default access** to do this.

b. Object Properties Tab

The **Object Properties** tab allows you to view the objects, sorted by type. In the case of the ANPR device you will have the options of viewing by ANPR Camera.

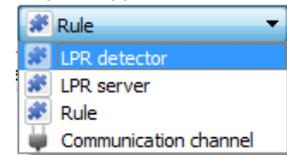
Configuration of 'Cathesis ANPR'

Object configuration | Object properties | Device events | Object groups | General

Object type: LPR detector

ID	Name	Enabled	Online
LprDetector.58F72C00_C9022FDA.1.1	ANPR Cam LPR	✓	✓
LprDetector.58F72C00_C9022FDA.1.2	Office Driveway LPR	✓	✓
LprDetector.58F72C00_C9022FDA.1.3	Spar ANPR LPR	✓	✓

Use the drop-down menu to view by the different object types:



c. Device Events Tab

This will list real time events happening on this device. It is an excellent way for installers to see that the integration is functioning, and to monitor the live events happening on site.

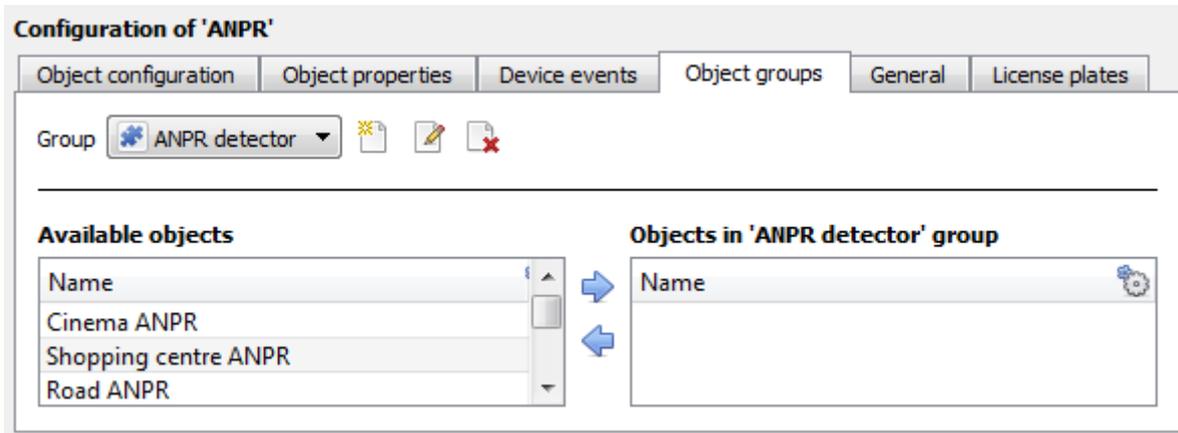
Object configuration | Object properties | Device events | Groups | General | License plates

License plate detection

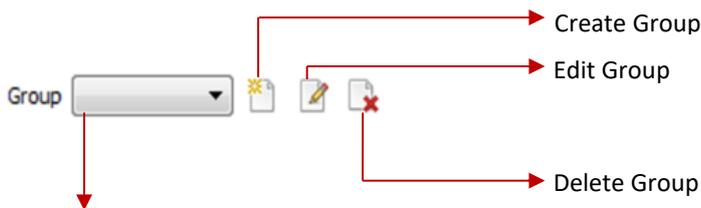
Time	License	License pattern	Confidence	Group	LPR detector
2015-11-24 10:03:13.277	ND72705		85		Spar LPR LPR
2015-11-24 10:03:11.477	727054		97		Spar LPR LPR
2015-11-24 10:03:07.077	ND72705		84		Spar LPR LPR
2015-11-24 10:03:04.677	ND727054		89		Spar LPR LPR
2015-11-24 10:03:03.077	ND72705		90		Spar LPR LPR
2015-11-24 10:03:01.877	ND727054		89		Spar LPR LPR
2015-11-24 10:03:00.277	ND72705		85		Spar LPR LPR
2015-11-24 10:02:43.277	ND727054		88		Spar LPR LPR
2015-11-24 10:02:42.077	ND72705		90		Spar LPR LPR
2015-11-24 10:02:33.517	ND727054		87		Spar LPR LPR
2015-11-24 10:02:30.077	ND72705		82		Spar LPR LPR
2015-11-24 10:02:28.877	ND796277		84		Spar LPR LPR
2015-11-24 10:02:08.670	ND72705		90		Spar LPR LPR
2015-11-24 10:02:07.470	ND727054		90		Spar LPR LPR
2015-11-24 10:01:54.070	ND727054		88		Spar LPR LPR
2015-11-24 10:01:52.870	ND72705		91		Spar LPR LPR
2015-11-24 10:01:48.870	NUR 16959		91		Spar LPR LPR
2015-11-24 10:01:42.470	ND727054		89		Spar LPR LPR
2015-11-24 10:01:40.270	ND72705		88		Spar LPR LPR
2015-11-24 10:01:20.895	ND72705		89		Spar LPR LPR
2015-11-24 10:01:19.695	ND727054		81		Spar LPR LPR
2015-11-24 10:01:18.295	ND72705		83		Spar LPR LPR
2015-11-24 10:01:17.095	ND727054		85		Spar LPR LPR
2015-11-24 10:00:41.289	ND727054		83		Spar LPR LPR
2015-11-24 10:00:39.089	ND273928		87		Spar LPR LPR

d. Object Groups Tab

You can create groups of the same type of object. This is useful when setting up **Events**: Instead of setting up **Events** for each individual detector, you can group them together according to object type.

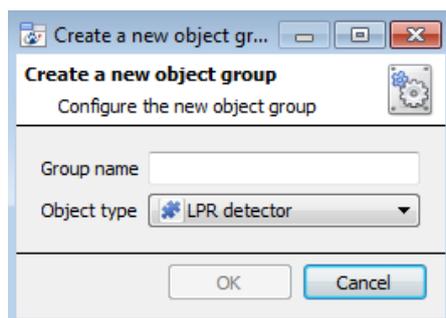


Create/Edit a Group



If you have already created a group type, select it here.

- **Create a Group**



Give the group a descriptive **Group name**.

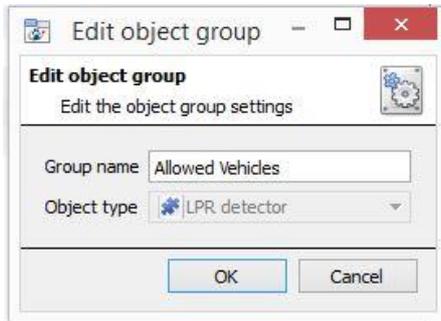
Click on the drop-down menu to select the **Object type** that you would like to include in this group.

Select **OK** when finished.

Once you have created your group, you will see a list of **Available Objects**.

You may now move objects from **Available Objects** to **Objects in 'Group_Name'** using the / buttons.

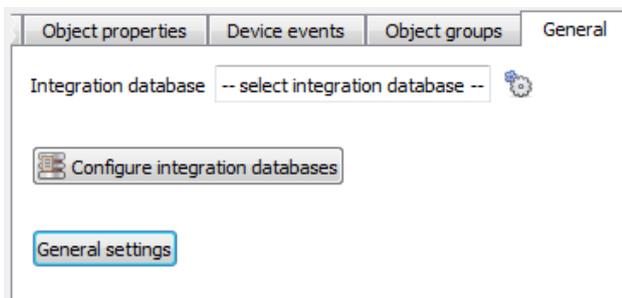
- *Edit a Group*



Note:

Once you have created a group, you cannot edit the **Object type**. If you want to change the **Object type** of a group you have created, you will have to delete it and create another group with the correct **Object type**.

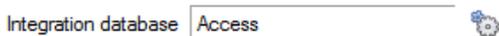
e. General Tab



Database Settings

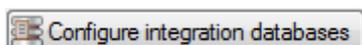
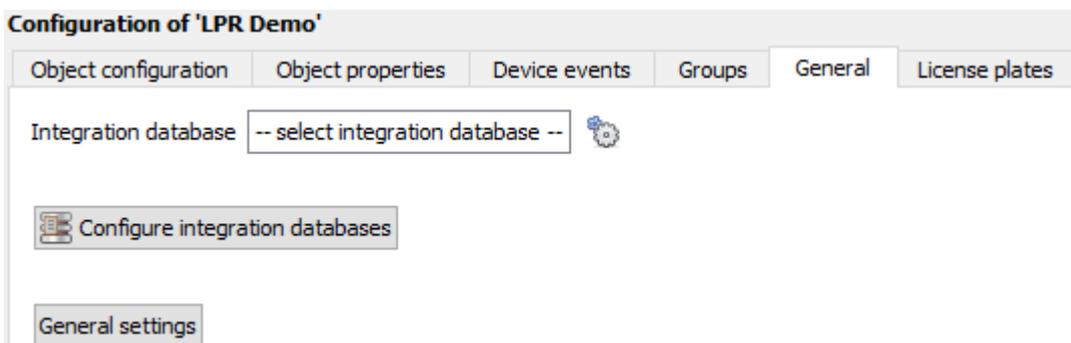
Here you will be able to select a pre-created database, or you will be able to configure a new database.

- *Select an Integration Database*



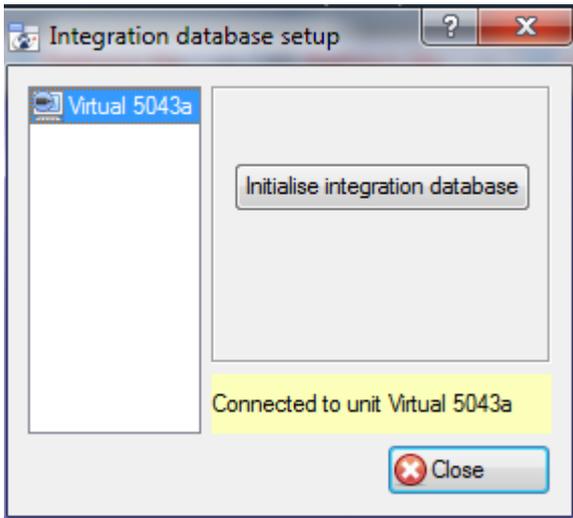
Click to select the relevant database. Only databases relating to the device you are adding should appear

- *Configure Integration Database*



If there is no database created yet, clicking on this button will take you to the integration database setup.

Initialise the Integration Database



The first time you add an integration database you will have to initialise this feature on the unit. This will add a broad database, within which you will be adding all of your integrated device's databases.

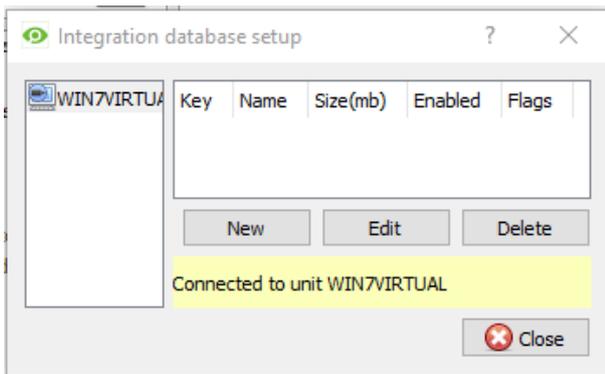
Select the unit you wish to add the database to, from the list on the left, and click **Initialise integration database**. You will have to choose which partition the database will be formed on, and select how much space it will take up.

Partition

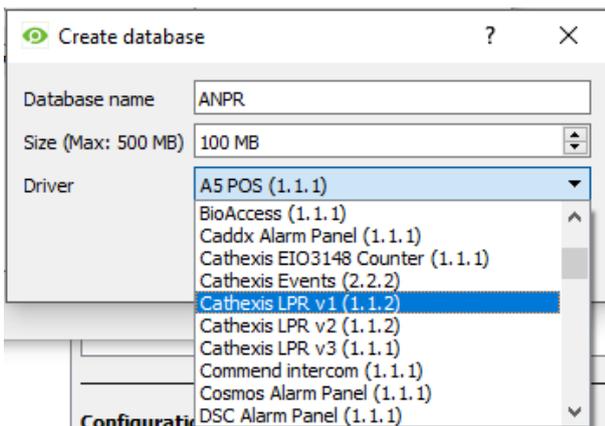
Total space available

Disk space allocated to integration database

Once the integration database has been initialised, you will need to create a database for the ANPR.



Click **New**.



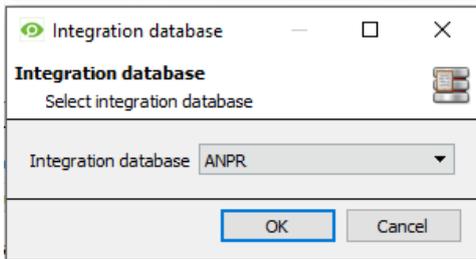
Give the integration database a descriptive name.

Set the size of the database.

Select the most recent version of the Cathexis LPR drivers for a new installation. The older versions are for legacy installations.

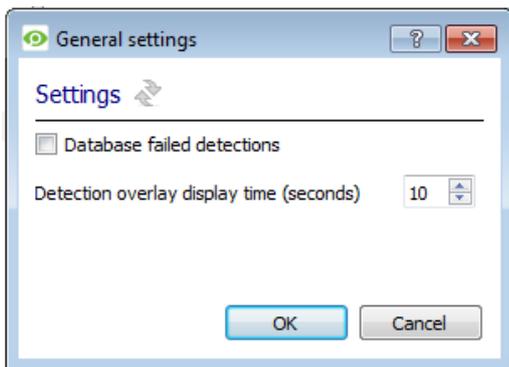
Click **Ok**.

In the main window, click the  icon and select your newly created database from the dropdown menu:



General Settings

Click **General settings** to configure general settings for the ANPR.

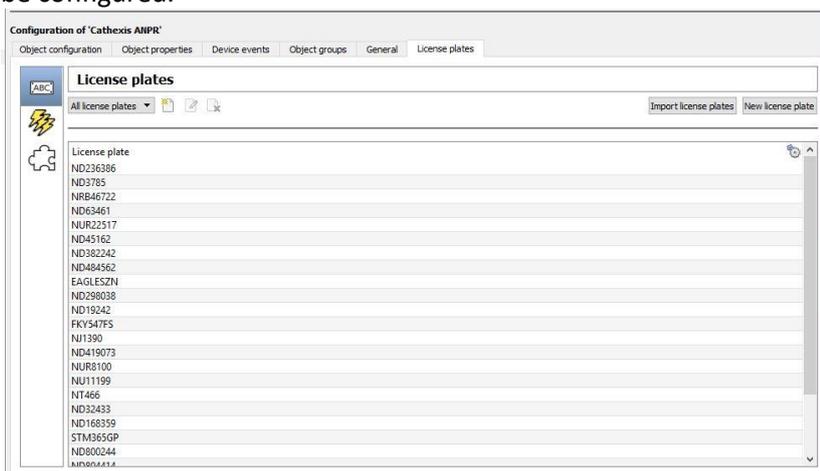


To enter failed detections into the database, check **Database failed detections**

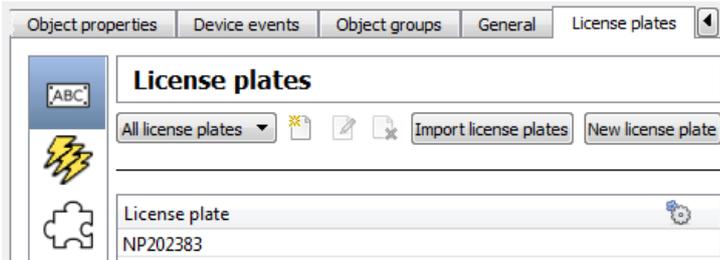
Set the **time (in seconds)** that license plate detections will be displayed as an overlay.

f. License Plates Tab

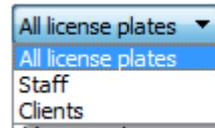
In the License Plates tab, license plates and license plate groups can be created, and traffic rules and plugins can be configured.



License Plates Section



Click the drop-down menu to change how license plates are displayed:



Display all license plates, or certain groups of license plates (if created).

- **License Plate Groups**



Create new license plate group.



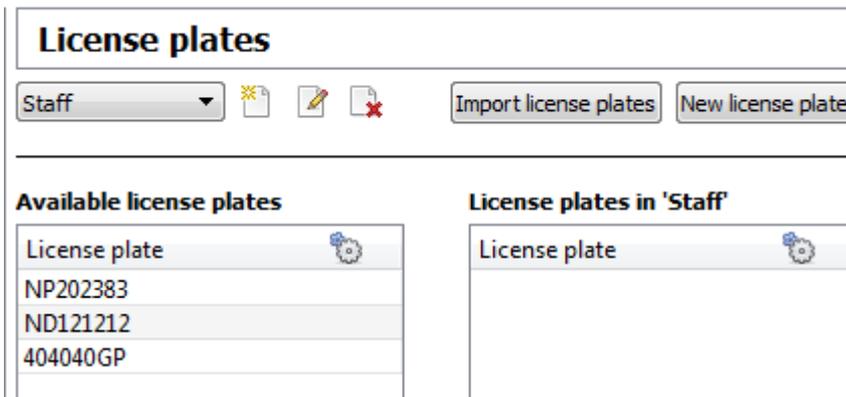
Edit name of existing license plate group.



Delete license plate group.

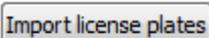
Tip: Groups are useful when setting up traffic rules. See below.

Once a group is selected, license plates may be added to it:

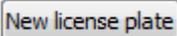


Add/remove license plates to and from the group using the arrows.

- **Create/Import License Plate**

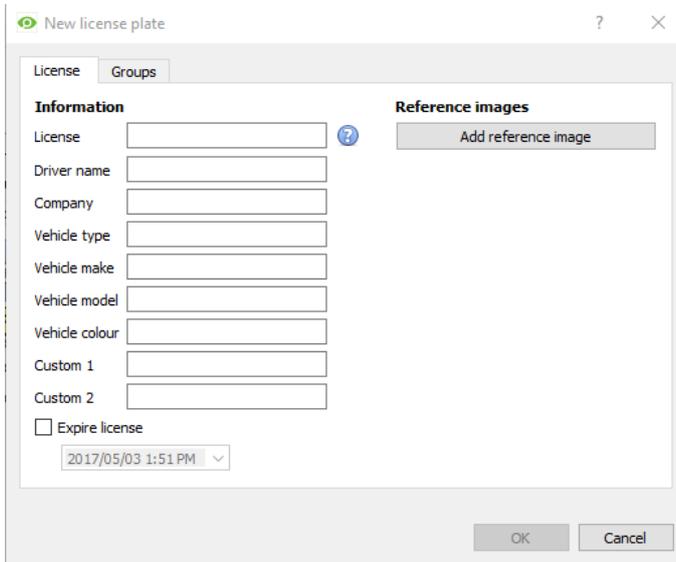


Click to import an existing license plate list in CSV format.



Click to create a new license plate. See below.

New License Plate



Fill in the meta-information associated with the license plate.

Add a reference image if necessary. This may be, for example, a picture of the driver or of the car.

Traffic Rules Section

Traffic rules can be configured to generate messages when defined traffic patterns are detected. For example, a rule can be configured to generate a message if a license plate is seen multiple times at a given location in a certain period. Currently there are two rules:

- **Visit location:** triggers if a license plate is seen at the same location multiple times.
- **Visit area:** triggers if a license plate is seen at multiple locations in a given time period.



- ***New Rule***

Click New to add a new traffic rule.

New rule

Name

Rule

Give the traffic rule a descriptive name.

Select the kind of rule to apply. See above for rule descriptions.

The settings options will change depending on which rule is selected. See below for appropriate rule.

Visit Location Rule

Name

Rule

Rule

Number of visits

Period

This rule will trigger if a license plate is seen 2 times at a location in 1 day

Rule Tab

Set the **number of visits** that will trigger the rule. Set the **period of days or hours** in which these visits must occur to trigger the rule.

Rule

Select the locations to check

ANPR Cam LPR

Office Driveway LPR

Spar ANPR LPR

Rule

License plate groups to INCLUDE

Staff

Clients

License plate groups to EXCLUDE

Staff

Clients

This rule will trigger for ALL license plates

Locations Tab

Select the locations to be checked. These locations are the sites at which the ANPR detectors are installed.

License Plates tab

If license plate groups have been created, they can be included in or excluded from the rule.

See the License Plates section for details on creating license plate groups.

Visit Area Rule

Name

Rule

Rule

Minimum locations

Period

This rule will trigger if a license plate is seen at ALL of the 0 SELECTED locations in 1 day

Rule Tab

Set the **minimum locations** that a license plate must visit in order to trigger the rule. Set the **period of days or hours** in which these visits must occur to trigger the rule.

Rule Locations License plates

Select the locations to check

- ANPR Cam LPR
- Office Driveway LPR
- Spar ANPR LPR

Rule Locations License plates

License plate groups to INCLUDE

- Staff
- Clients

License plate groups to EXCLUDE

- Staff
- Clients

This rule will trigger for ALL license plates

Locations Tab

Select the locations to be checked.

These locations are the sites at which the ANPR detectors are installed.

License Plates Tab

If license plate groups have been created, they can be included in or excluded from the rule.

See the License Plates section for details on creating license plate groups.

Plugins Section

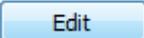
Object properties Device events Object groups General License plates

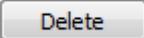
Plugins

Name	Description
Cathexis API	push to :80, HTTP server on port 33106

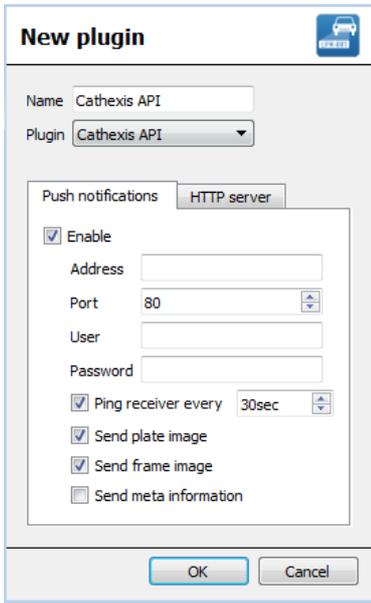
New Edit Delete 1 item

Click  to configure new plugin.

 to edit plugin.

 to delete plugin.

- *New Plugin*



Give the plugin a descriptive name.

Choose the plugin type from the drop-down menu.

Push Notifications Tab

Check **Enable** to enable push notifications.

Enter the **IP address**.

Enter the **Port number**.

Enter the **Username** and **Password**.

Set a **ping** frequency.

Select to send plate image.

Select to send frame image.

Select to send meta-information (if available).

HTTP Server Tab

Check to enable, and set port number:

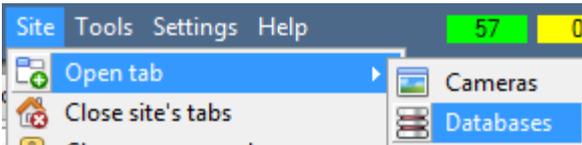
Enable
 Port

7 Database (All)

The database tab will allow you to navigate the databased entries for each individual database. In the database tab, each database is presented as a table. It has built in filters, and the ability to navigate by timestamp. If a database entry has an associated recording you will also be able to launch this recording, from within the database tab.

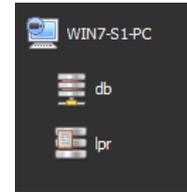
Most integrations will have a different database presentation, and unique filters, due to the different parameters sent to **CathesisVision** by the integrated device.

a. Navigate to the Database Tab

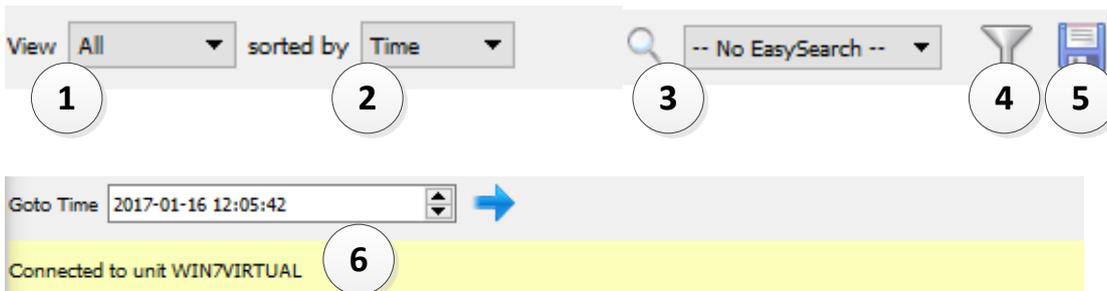


Once in the databases tab you will have to select the relevant integration database.

Choose the ANPR database.



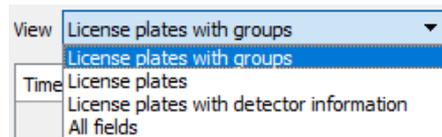
b. Database Interface



① **View**

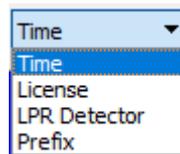
You may change the way that your database is presented.

Click the drop-down menu to change the view.



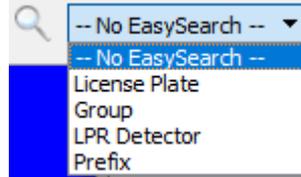
② **Sorted By**

You may sort the Events based on the following parameters:



③ Easy Search

The easy search option allows you to quickly search the database within one of the following options:

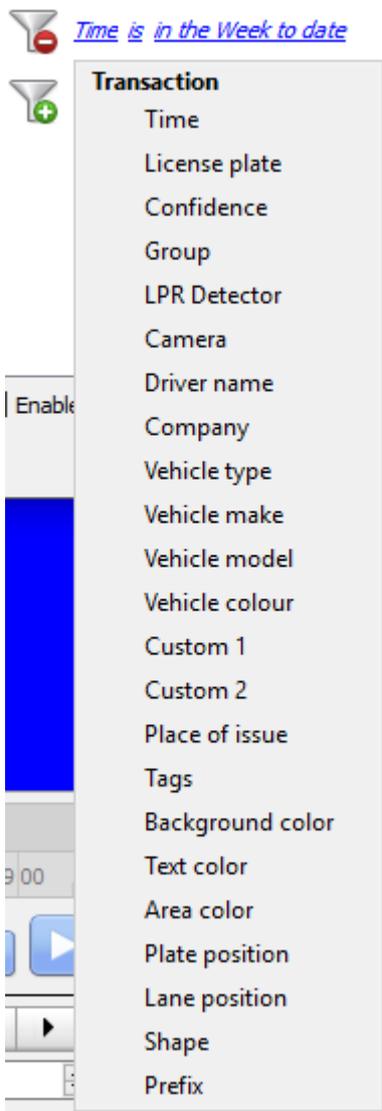


④ Filter

Filter offers a more advanced manner of sorting information in the **Integration Database** tab.

Once you have the filters dialogue open you will have the following options:

1. To **enable** filters check this box: Enable filters
2. To **add** a new filter click on .
The filter icon will change to when filters are active.
3. To **delete** an added filter click on .
4. To select a filter, click on the first hyperlink and select from the dropdown menu:



Note:

1. You may run multiple filters simultaneously. And you may even filter using the same parameter more than once.

- ⑤ **Export** Generate meta-database reports in PDF or CSV format. See below.
- ⑥ **Go to Time** This will allow you to go to a specific point in time, down to the second. To navigate to a timestamp set the time using the time and date boxes, and the click on the icon.

- **Generate Meta-Database Reports**

Click the icon to open the Export window.

Select the **Period** to export, and enter the required details.

Click **Next**.

Select the **Format** to export the report in; either CSV or PDF.

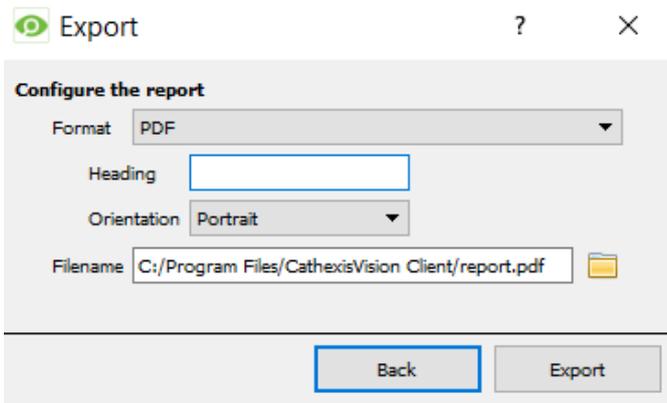
See below for the two options.

Export CSV

Select **CSV Format**.

Edit the **Filename** by either entering it straight into text field (replacing **report.csv**), or click the to choose a new save folder and filename.

Export PDF



Select PDF **Format**.

Give the PDF a **Heading**.

Select either Landscape or Portrait **Orientation** of the PDF.

Edit the **Filename** by either entering it straight into text field (replacing **report.csv**), or click the  to choose a new save folder and filename.

- ***Viewing an Entry's Associated Recording***

If you have attached cameras to device objects in the Integration setup, and have set these cameras up to record continuously, each Integration database entry will have a corresponding recording. To view a databased event's recording click on the event, and the video feed will appear in the replay area in the database.

8 Events (All)

A **CathexisVision** event has a trigger, which causes an action. You may set integrated devices to act as triggers, or as actions. This section will guide you through the creation of an **Event** and a **Trigger** to trigger that event.

For a comprehensive guide to Events, please consult the CathexisVision main Setup Manual.

a. Creating Events

Setup Tab → Configure Servers → ⚡ Events →

Give your event a descriptive name.

Give your event a **Description** for reference when **Databased** or when **Sent as an Alarm**.

Click on the to see a list of available descriptions.

Create/Edit recording schedules.

Set **Priority** level of event.

- **While/When and Any/All**

When triggering on a door you will have the option to trigger **while/when** a trigger is active. You will also be able to select multiple triggers, and define whether **all/any** of the triggers need to be active to set-off an event.

b. Creating Triggers

A trigger is the user defined input that tells the event to start. The trigger causes the subsequent action (which the user will also define).

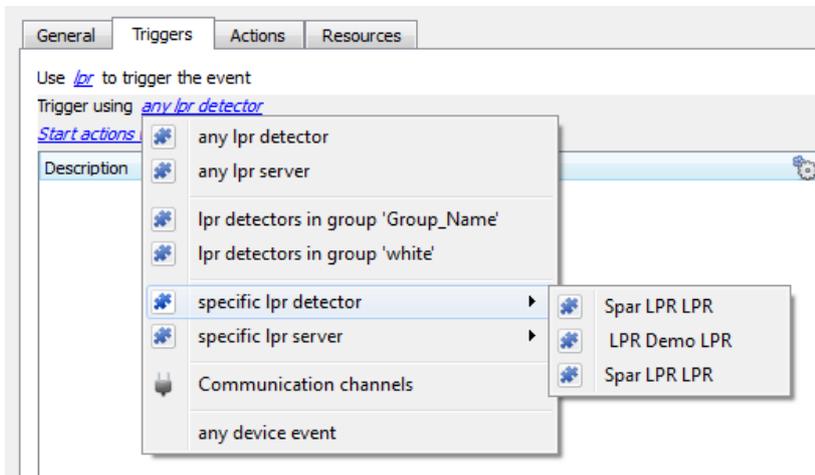
Setup Tab → Configure Servers → ⚡ Events → → Triggers tab.

- *Set Your Device as the Trigger*

If you are creating a new event, the trigger type will default to: Use [standard triggers](#). To define which device you would like to trigger the event with, click on the hyperlink after “use”. To set it as the **ANPR device**, click on the hyperlink, and select the relevant device name from the dropdown menu.



Once you have chosen your ANPR device to trigger the event, the window will present different **Trigger Type** options:



Any object (ANPR detector/server) will trigger an event if any of the chosen objects send information.

Trigger an event using **groups** you have created.

Specific ANPR detector/server will trigger an event only if the specific device sends information.

Any device event will trigger on any event that occurs on the device. Within the “any device event” setup you may set “device event rules” which will constrain which device events will trigger the event.

Databasing Group Triggers

If you want this event to be databased under the name of a specific object, and not the name of the triggering group, you will need to modify the **Description** field in the **General tab** of the **Event** setup.

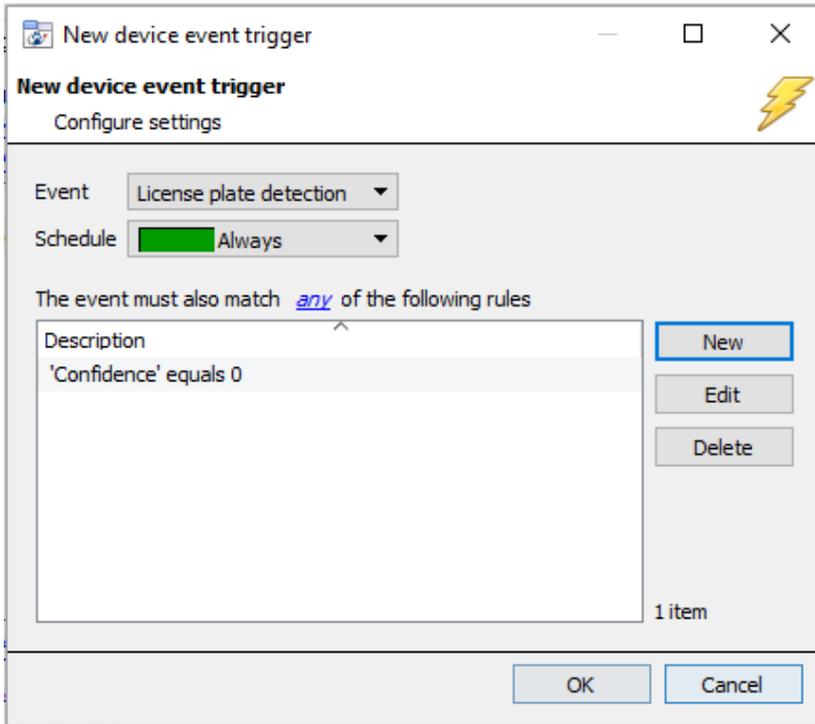
c. Adding Triggers to an Event

After selecting a trigger type, you will need to add a trigger to the event. Click on in the **Triggers** tab. This will bring up the dialogue box where you can set up rules for the triggering of an event.

- *Any Device Event: Adding Trigger Constraints*

If you selected **Any Device Event** to trigger an event from the dropdown menu in the previous section, then you will be presented with the following window:

Note:



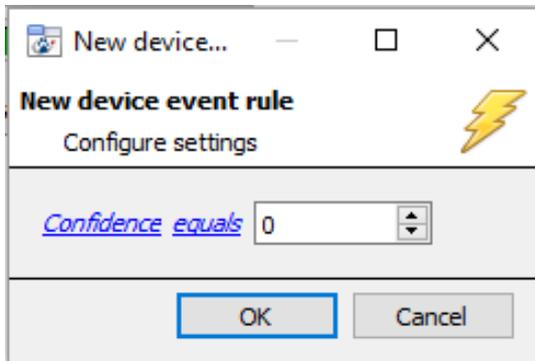
Click to select [any](#) / [all](#) from the dropdown menu.

NB: You may set multiple constraints. These constraints need to be fulfilled to set off a trigger. If you do not define a constraint, e

Click to **Add/Edit/Delete** a constraint.

Clicking **Add/Edit** will bring up the window below.

- **Add/Edit Constraints**



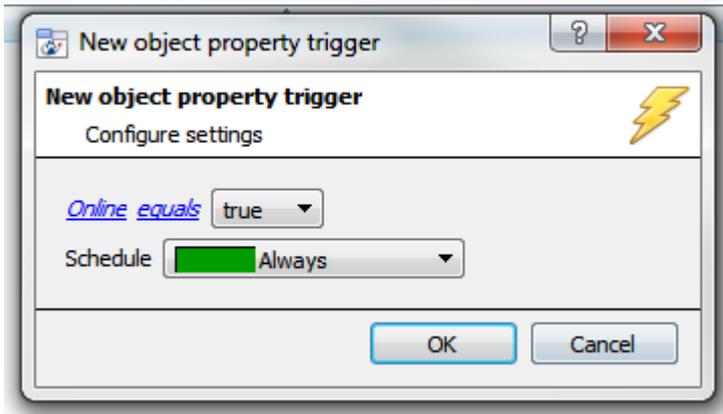
To change the constraint, click on the first hyperlink; this will bring up the full list of available rules.

To modify the way this rule will be treated click on the second hyperlink; this will show you the rules options.

Note: When all available options are known to **CathexisVision** you will see a drop-down menu. When these variables are not pre-defined you will need to fill them in yourself. The information pulled through to the events is information sent to CathexisVision from the ANPR device. See either the ANPR settings, or the **Integration devices** —> **Device Events**, for the strings needed here.

- **Non-Any Device Event: Adding Triggers**

If you have chosen **Any object (ANPR Detector/Server)** to trigger events, the triggers will have a slightly different setup window. In these instances, you do not need to set constraints, since you are essentially adding them one at a time. This option is better if you have a select few triggers that you want to use.



Since you are only using one type of object to trigger the event in this instance, the dialogue will appear as the **New Device Event Rule** window did previously.

Note: this is true for groups too, since a group may only be made up of one object type.

d. Actions

Once you have defined the triggers that are going to initiate your event, you will need to define some Actions.

Many integrations have the **Action option** to control the integrated device; because of the nature of this integration this option is not available with the ANPR device. However, you may choose any of the **CathexisVision Action options** -- which are detailed extensively in the **Main Setup Manual**.

9 Site Optimisation (All)

Site optimisation is critical to the efficiency of the CathesisVision ANPR detection. Each site presents a unique set of parameters that will need to be specifically configured for the environment in which the ANPR is required. To assist with the site ANPR setup CathesisVision provides the ANPR engine operation statistics which indicate the performance of the engine. Running through these statistics as an optimisation 'checklist' will increase the efficiency of the ANPR detection.

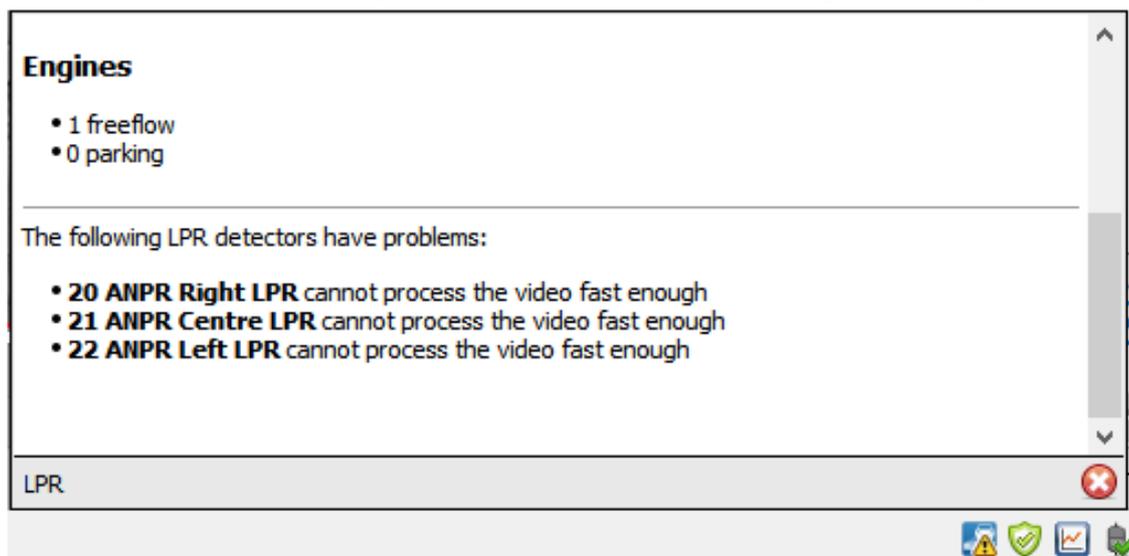
a. Check for System Issues



To ensure that there are no system issues hindering the detection, consult the status bar at the bottom right-hand corner of the GUI. There you will find warnings concerning unlicensed engines, possible detector delays, and similar. Click the ANPR icon  to display ANPR specific information about the site.

LPR Cannot Process Video Fast Enough

This warning is shown if the average processing time far exceeds the norm for the various plate types (e.g., Latin 100ms, and Arabic 200ms). There are ways to reduce the average processing time. See below.



Improve Average Processing Time

- Reduce the sensitivity of the motion trigger to increase the percentage of 'frames with licenses.' Consult the ANPR stats for this information.
- Position the camera to avoid unwanted motion triggers, such as people walking past or a busy road adjacent to the detection area.
- Reduce the frame rate of the detector – the default is 5fps.
- Reduce the resolution and framerate of the ANPR video feed.

b. Statistics

These statistics can be accessed via:

Help Menu → Local Server Stats → Others → LPR

1. Decode queue: If not clearing to 0, check the presented frame rate, CPU load and detector sensitivity.
2. Pop f/s: Should be almost same as detector setting.
3. Timings: Min/average/max time to process a frame.
4. Frames with Licenses: The higher the percentage the better.
5. Ensure that your long term incoming frame rate is lower than the ability of the server/engine to consume frames. A good example is to check the average processing time per frame against the framerate. If the average processing time is higher than the inter-frame time, there will be a processing bottleneck. If the engine can only process at 5fps (200mS/frame) then presenting it 8fps is not efficient.

c. Cameras

1. The recommended camera resolution is HD: 1MP to 2 MP.
2. If the number plate image is not sharp enough, increase the shutter speed. The standard is 1/500. If the shutter speed is too fast there will not be sufficient light on the image. Make small incremental changes and test.
3. Check the positioning of the camera such that the license plate orientation to the camera is as constant as possible - no turns or bumps.
4. Check that the time the license plate is in the detection zone for is long enough to capture sufficient frames for processing.

d. Servers

1. Check that the most current CathexisVision software is loaded.
2. Check that the most current ARH Carmen software and engine is loaded.
3. Each FreeFlow engine requires a single CPU core - check the CPU individual core loads.
4. An i7 CPU is recommended for an ANPR application with high traffic flow at any time.

d. Detectors

1. Check the system trigger is correct.
 - a. If for a Triggered (parking) application, then the ground loop or IR beam functionality must be checked.
 - b. If for a FreeFlow application using the motion trigger, adjust the sensitivity: check the "frames with licenses" in the Stats for as high a percentage as possible. The higher the sensitivity the lower the percentage of frames containing license plates will be.
2. Check that the detection frame rate is within the capabilities of the engine to process them timeously. Refer to the stats for this information.
3. Adjust the valid detection parameters as required – e.g. 2 out of 3 frames, 2 out of 4 etc. Note that the minimum time for a full detection is determined by these settings. With a 150mS frame processing time, the minimum detection value is $2 \times 150\text{mS} = 300\text{mS}$.
4. When selecting the valid detection parameters (2 out of 3 frames, 2 out of 4 frames etc.), the required accuracy or the speed of the detection must be taken into consideration.
 - a. For a high security application, 4 out of 5 frames would probably be required but the detection times would be increased.
 - b. For a shopping center. 2 out of 4 frames will provide a quicker detection time but less accuracy.



10 Conclusion

Please remember that this appnote was designed to deal specifically with this integration. For further information about the CathesisVision software please consult the main manual (<http://cathesisvideo.com/>).

For support please contact support@cat.co.za