NVA ALPR On-Camera Software

for Hanwha Vision Cameras

Software Configuration Manual

Version 1.0

December 2024

1. Introduction

ALPR (Automatic License Plate Recognition) is an image processing technology used to detect and decode license plates on stationary or moving vehicles. It is also known as ANPR (Automatic or ANPR (Automatic Number Plate Recognition).

The NVA ALPR On-Camera Application runs at the edge, embedded on certain models of Hanwha Vision cameras including Wisenet 7 and CV2X based models where it reads, saves and transmits license plates in real time. *Contact NVA for a current list of supported models.*

1.1 Requirements for License Plate Images

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:

Mist and frost can cause problems at a distance

- Overexposed
- Blurred
- Distorted
- Unevenly lit
- Low contrast
- Bad weather conditions
  (e.g. fog, frost or snow)

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

As a general guide, if a human has difficulty reading a plate, then so will an ALPR camera and it is recommended that the images captured by the ALPR cameras be more like the first two examples shown above.

1.2 Camera Requirements

An intelligent ALPR camera is a specialized CCTV camera that has in-built software to identify license plates on still or moving vehicles. It is recommended that you use a Hanwha Vision Camera with the correct processor for the installation and solution requirements. NVA ALPR is available for both Wisenet 5, 7 and the more powerful CV2X processors.
Contact NVA for a current list of supported models.

1.3 Frame Rate – this does not need to be set for NVA ALPR On-Camera

The frame rate measured in frames per second (FPS), is the number of frames or images that the camera can capture per second. When using the Hanwha Vision camera to send a video stream to a PC running NVA ALPR or if using the camera to send video to a VMS such as Wisenet Wave, ACS, Milestone or Genetec – then the frame rate should be specified as shown below.

However – if you are running the Hanwha Vision On-Camera NVA ALPR App then there is no need to set the frame rate. The App will set this internally.

If you need to set the frame rate for your own use see below:

- ❖ *Lower frame rates:*
  - *Can result in jerky video*
  - *Are ideal for locations with slow-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***

1.4 Shutter Speed – must be set up for ALPR use

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)***

1.5 Resolution and Lens Focal Length

1.5.1 Resolution - does not need to be set here for NVA ALPR On-Camera, it is set up from within the App.

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.

As a general rule, the ALPR software requires about 256 pixels per linear metre (for EU & larger format plates) across the camera's field of view to achieve good recognition and so a 3m wide lane would need a minimum resolution of 800 x 600. (More for challenging angles).
US and Arabic plates require a resolution of 300 pixels per metre.

When using the Hanwha Vision camera to send a video stream to a PC running NVA ALPR or if using the camera to send video to a VMS such as Wisenet Wave, ACS, Milestone or Genetec – then the resolution should be set as shown below.

- ***Barrier or Gate*** → *Resolution **800 x 600 pixels** or higher*
- ***Roadside - Single lane*** → *Resolution **1280 x 720 pixels** or higher*
- ***Roadside - Dual lane*** → *Resolution **1920 x 720 pixels***

1.5.2 Focal length

The focal length of the lens determines how "zoomed in" the image is. It is usually expressed in millimetres (e.g. 25 mm or 50 mm). The focal length tells us the field 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 field of view and the higher the magnification. The shorter the focal length, the wider the field 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.

IMPORTANT: The **lens** should be **IR corrected** to avoid out of focus images when the camera changes between day and night mode.

1.6 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 is normally built into the camera but can be 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.)*
Adding extra IR can increase the reading distance at night.

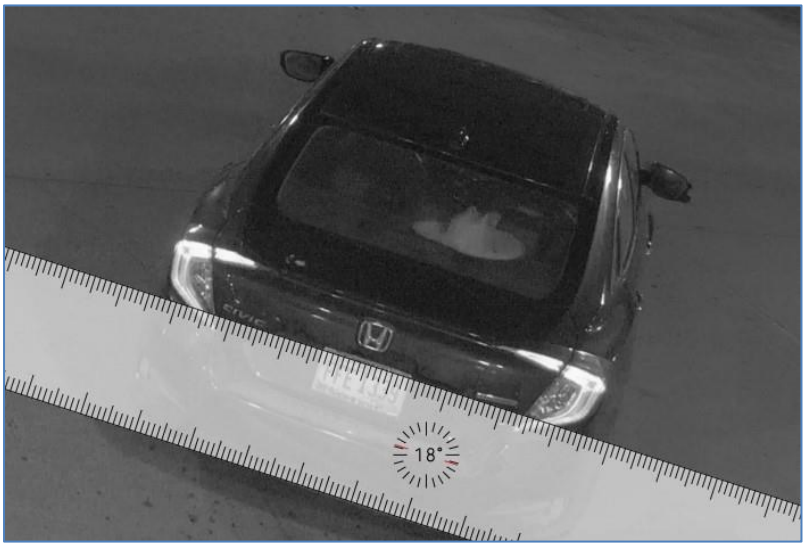
1.7 Other requirements

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

1.7.1 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°***



Example of 18° Roll and a sub 20° Pitch

Accuracy will decrease significantly as the angles increase

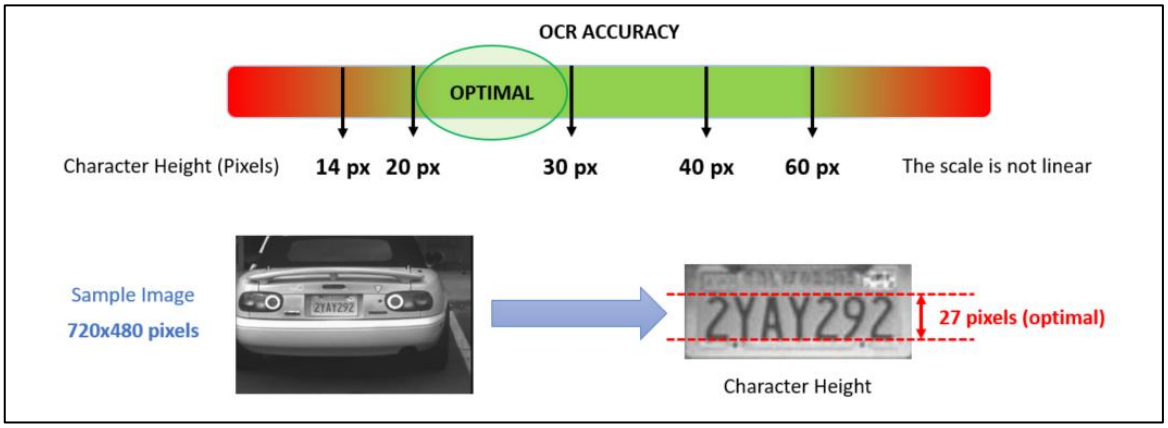
1.7.2 Distance

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 analysed 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.

2. Camera Setup and configuration for License Plate Recognition

In this section, we describe how to:

- Set up the Hanwha Vision Camera for optimum image quality
- Configure the NVA ALPR On-Camera software

2.1 Setting up the Hanwha Vision Camera

Once the Hanwha Vision 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 Hanwha Vision documentation for the default IP address and username/password)*

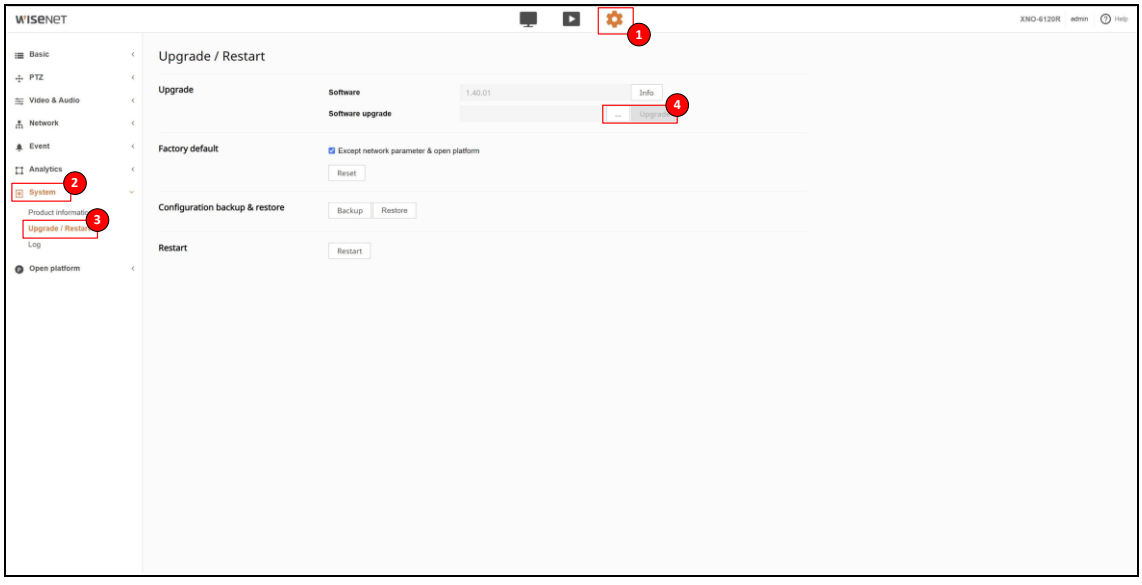
Once logged on, check for the latest firmware update from Hanwha Vision.

2.1.1 Check for the latest firmware

Select the System tab and the Upgrade/Restart. On the right you will see the link to select a firmware file and upgrade your camera.

To Upgrade select

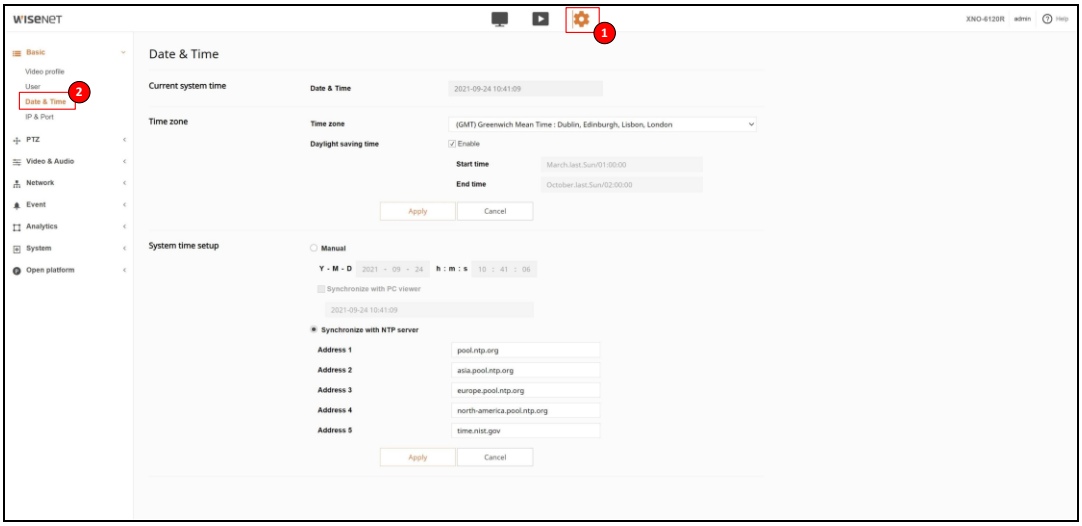
1. Settings
2. System
3. Upgrade/Restart
4. Select file and upgrade



2.1.2 Set the date and time of the camera

To set the date & time select

1. Settings
2. Date & Time



Hanwha Vision camera setup: System > Date & Time

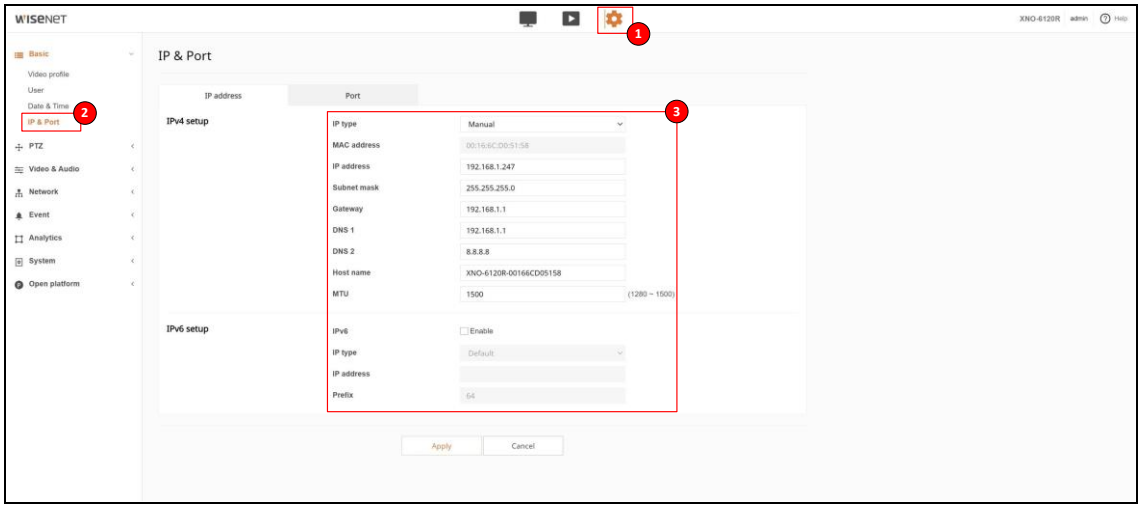
In this example we are using an NTP server. This is important to maintain an accurate time for each plate captured especially when using ALPR for security or parking violations.

2.1.3 IP Configuration

Before installing the software, please configure the IP and DNS settings as required ensuring routes are available for the reporting options. To do this go to the main Hanwha Vision setting menu and select System and then IP & Port.

To set the IP Configuration select

1. Settings
2. IP & Port
3. Settings as required



Usually users choose Google's is 8.8.8.8 with a secondary server of 8.8.4.4.
These are free Google DNS servers which will map any domain names needed to the correct IP address.

2.1.4 Recommended frame rates, shutter speeds and resolution

Note that the resolution for the WN5 cameras is fixed at 720p the resolution and FPS in the video profile will not affect the on-camera app.

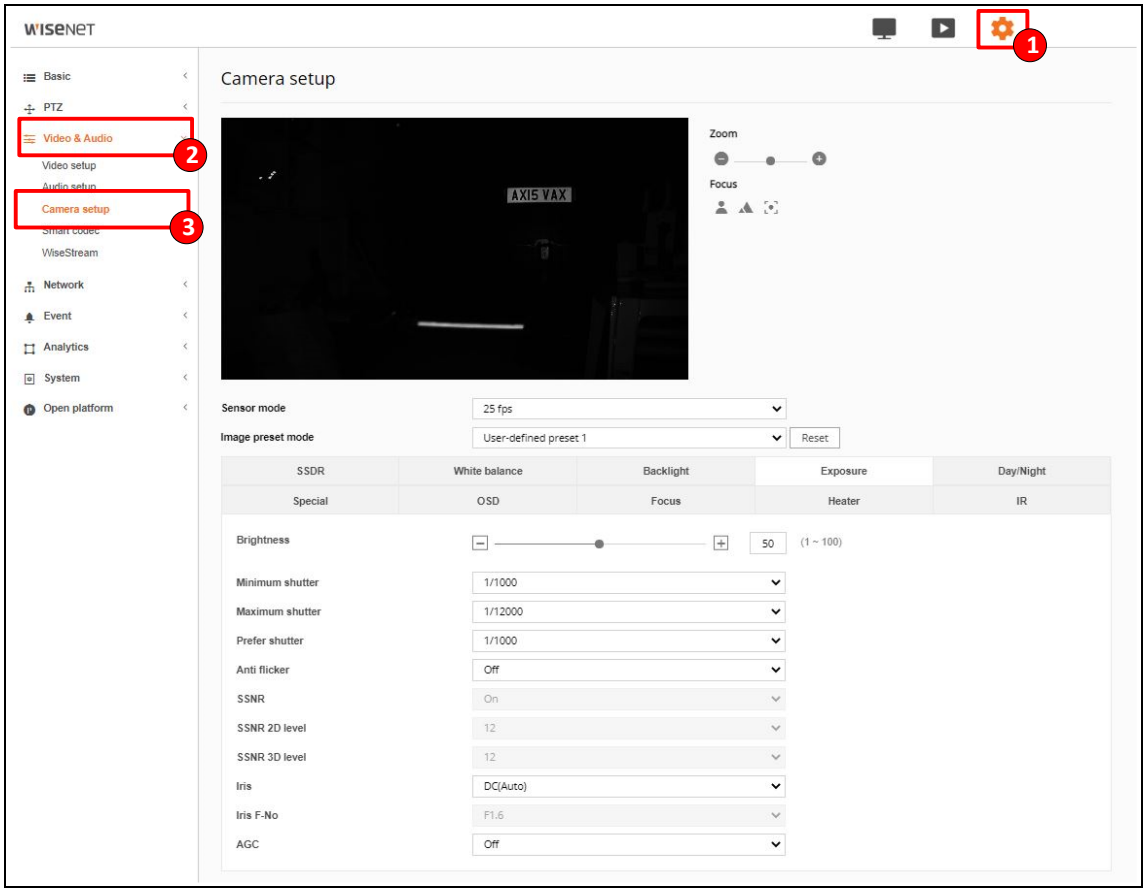
Set the shutter speed as needed noting that different shutter speeds should be setup depending on where the camera is to be placed:

- **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)

2.1.5 Shutter speed and other important image settings

To set the **shutter speed (minimum exposure time)** and other important settings in the Hanwha Vision camera:

1. Settings
2. Video & Audio
3. Camera Setup



It is recommended that you park a vehicle or place a license plate in the region of interest.

Important camera settings

- Set the **autofocus** area on the license plate and click Autofocus. If the license plate is still not in focus, fine-tune using the manual focus. It is always recommended to set to manual focus moving forward as using autofocus at night can drag the camera out of focus.
- Set **Sharpness** to 0 or a low value, you do not want the camera enhancing character edges.
- Do **not** enable **Wide Dynamic Range**.
- Set the **IR-cut filter** to Auto. This causes the filter to be present on colour images (to remove IR light interference / colour distortion) and be Off when it gets dark and the IR illumination switches on (if present).

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)

- Set the **Maximum Shutter** speed (maximum exposure time) to the required value.
- Set the **Gain** to off or the lowest acceptable. If the plates are overexposed – reduce this value.
- **Exposure level** – this setting will attempt to lighten or darken the resulting image – subject to the gain, iris and shutter settings. Normally leave midway.

Test the above settings by running through the scenario with a vehicle. For best results, test the settings in the darkest lighting conditions. This way, you get a good result both during night-time and daytime.

Note that cameras with a motorized varifocal lens will need re-focusing after a zoom change. A true motorized zoom lens that will maintain its focus.

2.1.6 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:

3. Installing and licensing the NVA ALPR On-Camera Application

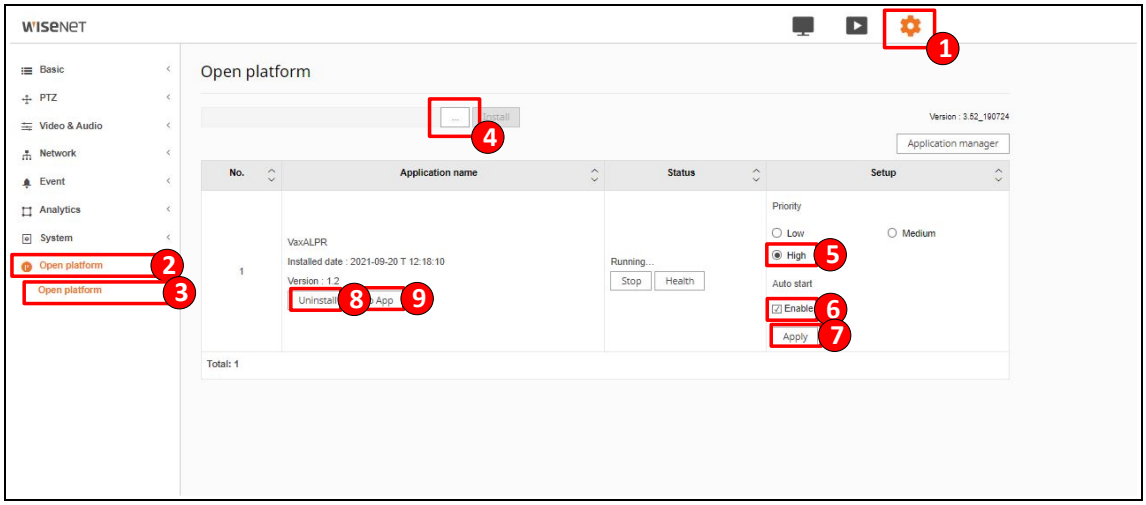
Once the Hanwha Vision camera is installed and setup, we need to install and configure the NVA ALPR On-Camera software. The following steps are recommended:

1. Install the ALPR software
2. Upload the license key
3. Start the software
4. Configure the software
5. Confirm the software is working correctly and providing the expected results

3.1 Installing the software

To install the NVA ALPR On-Camera software, do the following:

1. **Settings**
2. **Open Platform**
3. **Open Platform**
4. Select **…** and browse to the latest software and select install
5. Once loaded select **High priority**
6. Enable **Auto Start**
7. Select **Apply**
8. Select **Start**
9. Select **Go App** to open the application screen

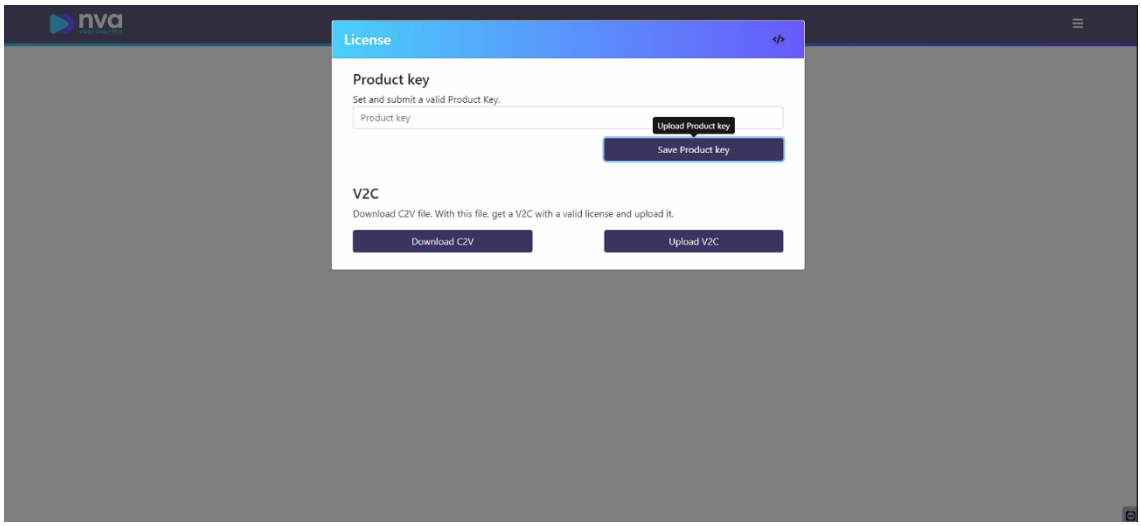


3.2 Upload the license key

When opening the App for the first time or if the trial license has expired the software will highlight that it does not have a valid license.

Once you select Go App in the Open Platform Page the software will open the Load License screen. (see image below) Licenses can be redeemed in 2 ways: -

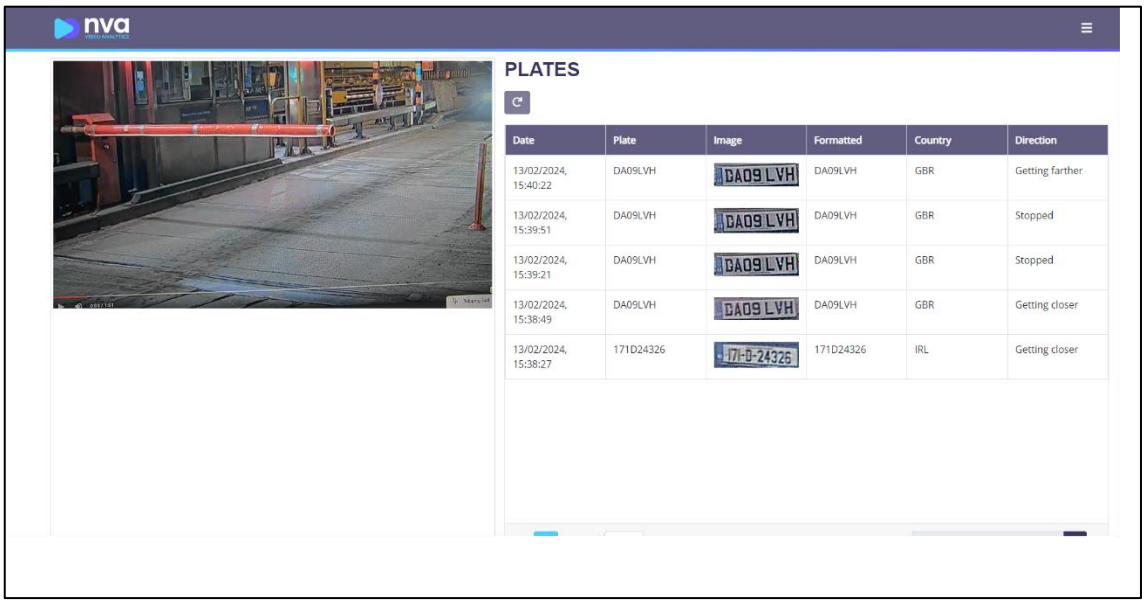
1. Online (Camera must have access to http://licensing.nvasoftware.com)
    a. Type or copy in the provided product key
    b. Select **Save Product Key**
2. Offline
    a. In the NVA app on the camera, download the C2V file from the license page.
    b. Go to http://licensing.nvasoftware.com using a web browser and login with the product license key. Upload the C2V file, generate and download the V2C file.
    c. Go back to the NVA app on the camera and select **Upload V2C** and browse to the V2C file. Select open and submit the V2C. This will license the application on the camera



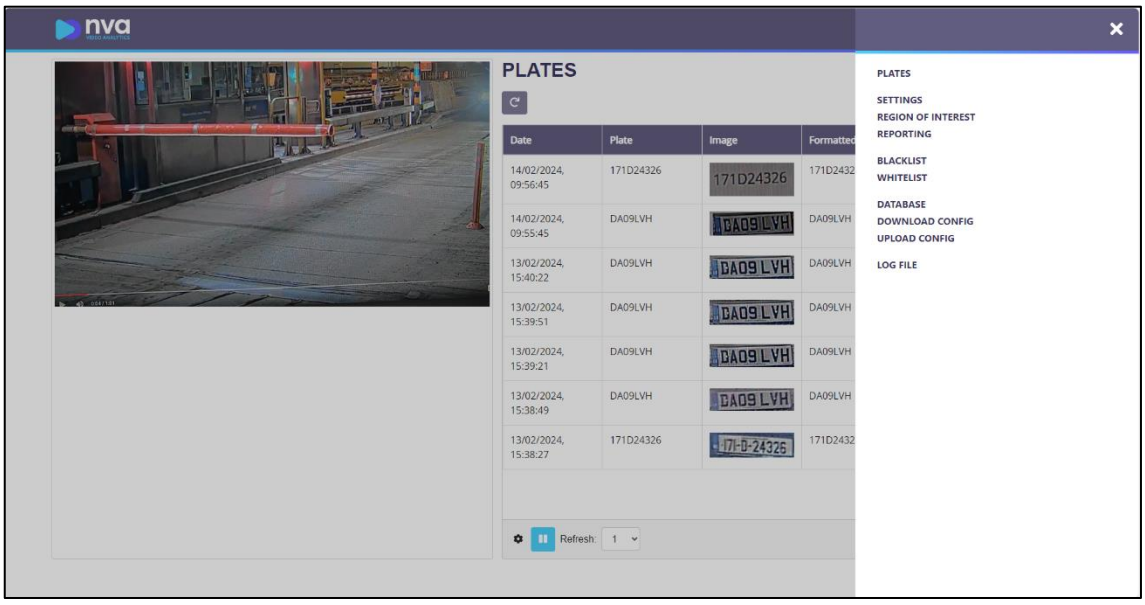
4. Configuring the NVA ALPR On-Camera Applicaton

NVA ALPR On-Camera application user interface

Selecting the Menu icon will reveal the application's main menu. The default option shows the Plates screen where recent plate captures are displayed:



The 3-bar icon in the top-right corner reveals the main drop-down options menu:

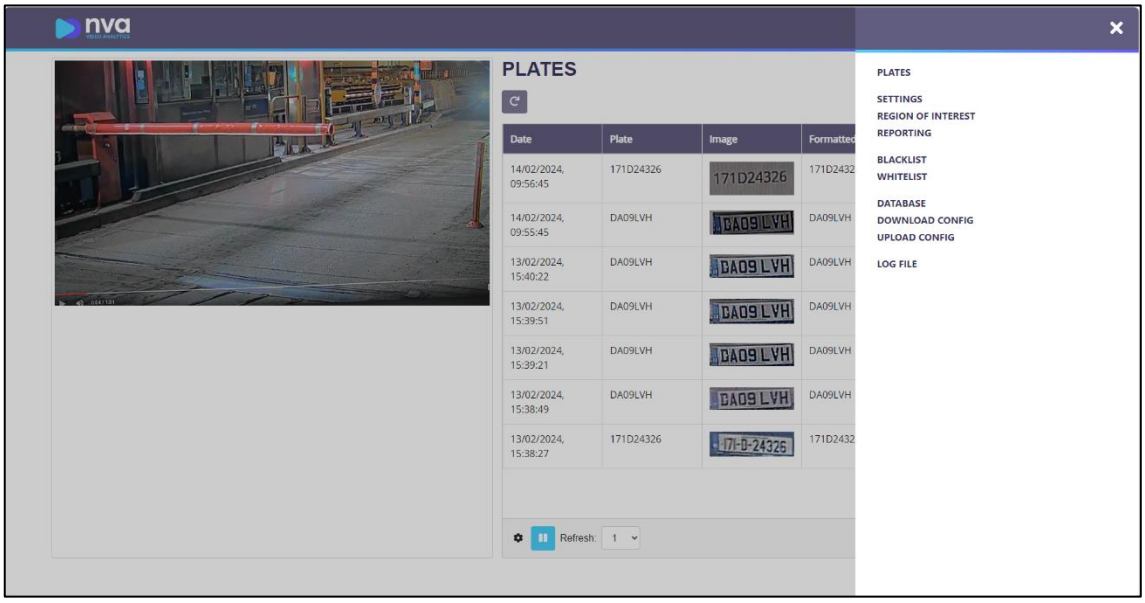


The main options include:

1.	PLATES	To display a live feed of all the most recent plates read
2.	SETTINGS	To configure the NVA ALPR On-Camera software
3.	REGION OF INTEREST	To add/edit Regions Of Interest (ROIs) to include or exclude areas within the image from the ALPR analytics
4.	REPORTING	To configure the reporting options
5.	BLACKLIST	To view and manage the on-camera Blacklist
6.	WHITELIST	To view and manage the on-camera Whitelist
7.	DATABASE	To review and search the list of recorded plates (if configured)
8.	DOWNLOAD CONFIG	To export the NVA ALPR On-Camera settings
9.	UPLOAD CONFIG	To import the NVA ALPR On-Camera settings
10.	LOG FILE	To display the latest System Log for debugging purposes

5. Plates

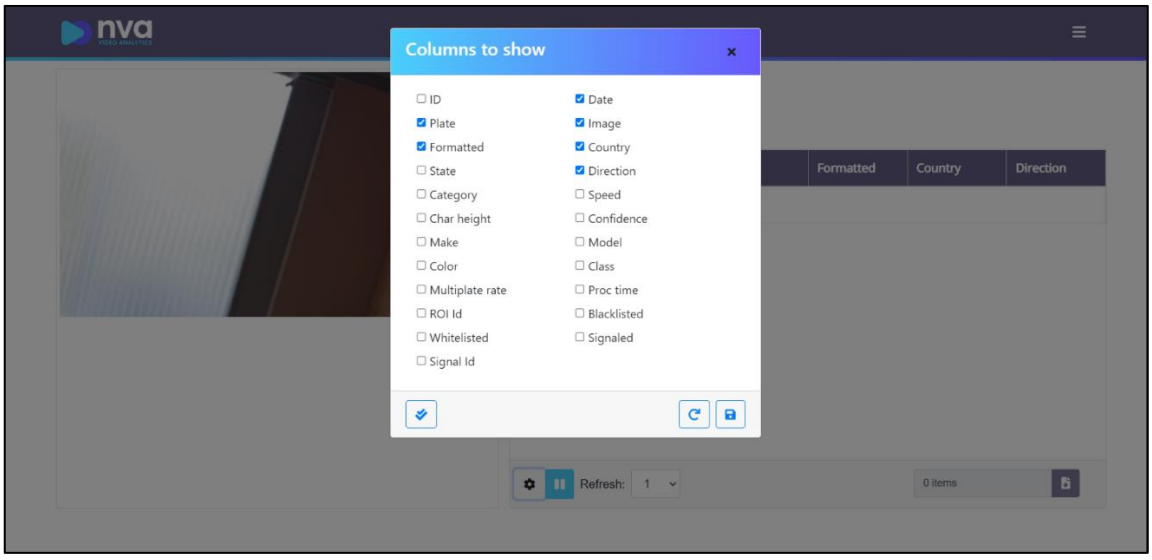
The 10 most recent plate reads are stored in the camera's internal memory and are displayed when the Plates menu is selected:



5.1 Main Page

1. Refresh / Pause: Select to refresh the current view and load the most recent plates
2. Cog Symbol: Configure Columns. Select to define which columns are shown
3. Play: Select to continuously refresh the current view
4. Navigation: Select to navigate through the database pages to display previous detections
5.

5.2 Configure Displayed Columns

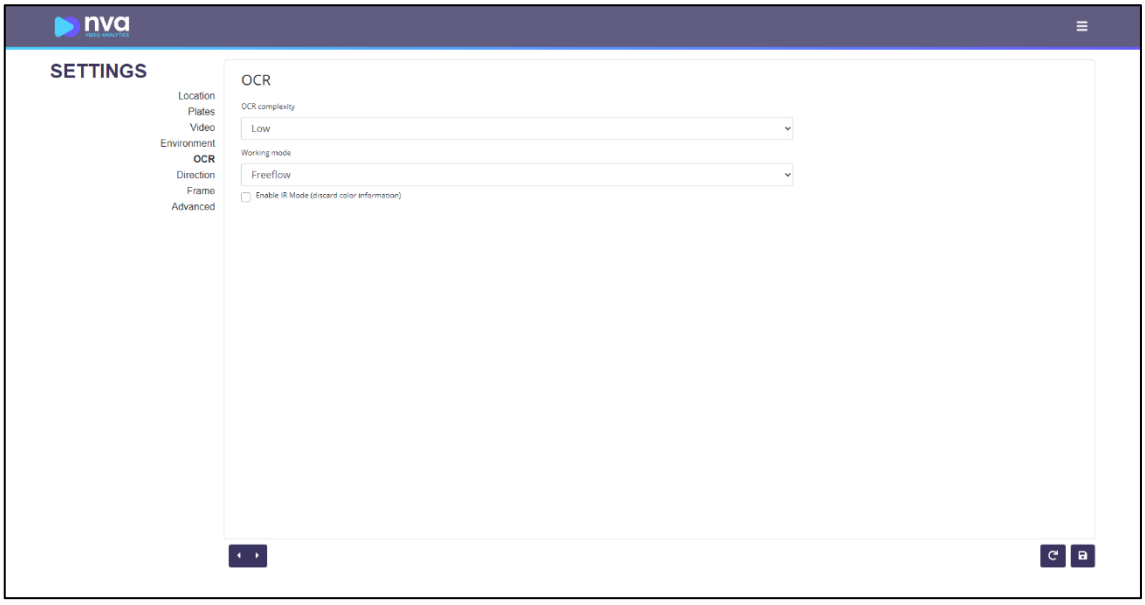


1. Available Columns: Select the available columns to display them in the main screen

2. Select All: Click the double tick to Select All columns.
3. Refresh: Select to revert to the previously selected columns
4. Save: Select to save the current column selection
5. Cancel: Select to cancel and close the screen

6. Settings

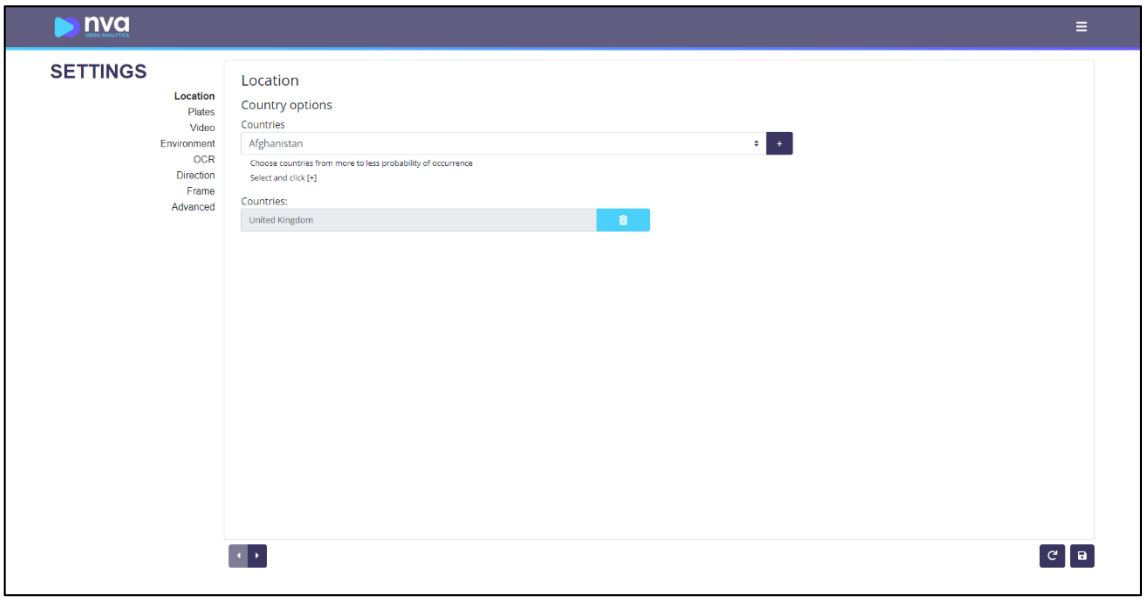
After clicking Settings a list of options are displayed starting with “OCR”.



Setting Options

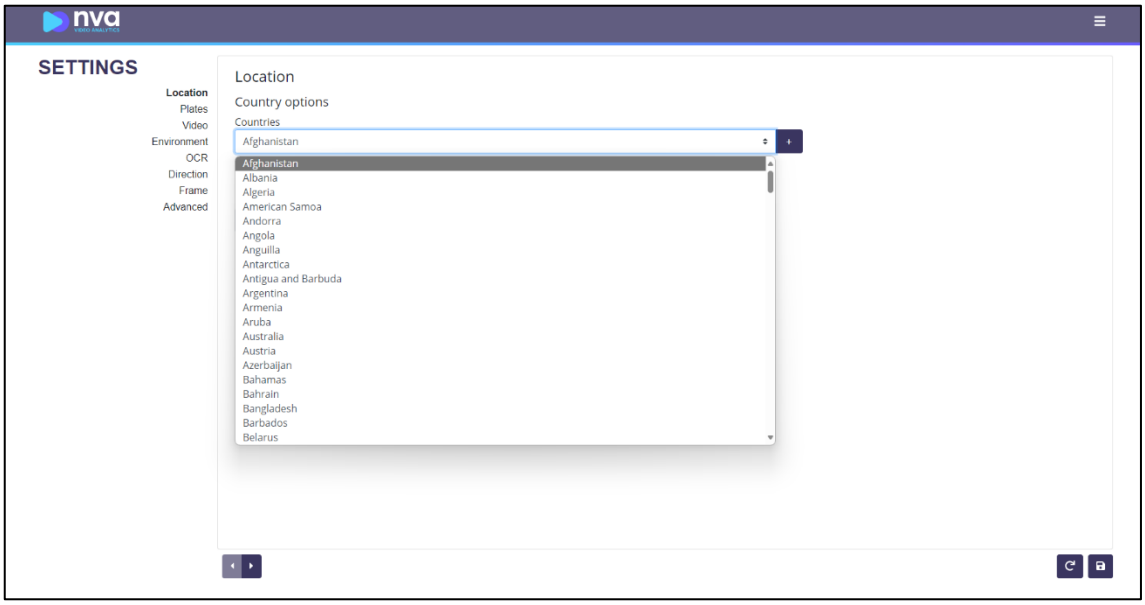
1. Location: Configure the countries to recognise plates
2. Plates: Configure the on-camera database, Lists and transmission parameters.
3. Environment: Configure re-entry time, frame captured & number of plates to capture
4. OCR: Set the OCR complexity and Working mode
5. Direction: Specify which plates are to be reported by direction of travel
6. Frame: Specify the JPEG compression factor of the main image and plate patch & add a watermark
7. Advanced: Use this on instruction from NVA only to configure diagnostic information

6.1 Location



Countries

At least one country must be selected as a primary location for the camera but there is no need to select any other secondary countries, the software will automatically detect these for you.

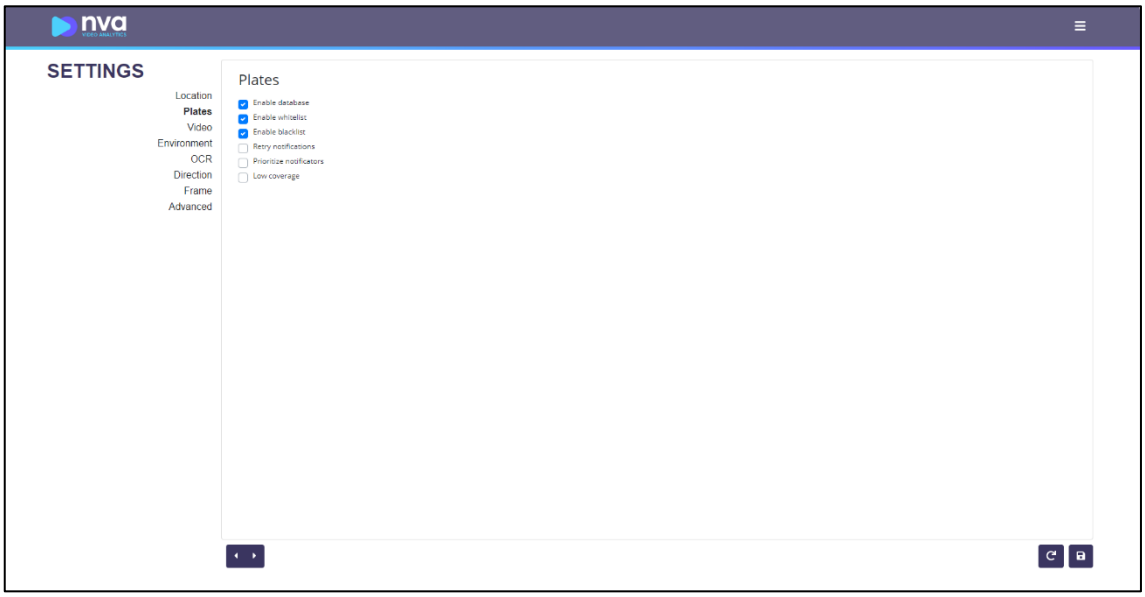


Required State

If one of selected countries is *United States*, a primary main state must be selected from the drop-down menu. There is no need to select secondary states, the software will automatically detect these for you. If USA is selected, other American countries will also be detected.

Click the Save icon to save any new settings.

6.2 Plates



6.2.1 Enable database

Select this checkbox ☑ to enable the onboard recording of the Plate results to the camera's SD card. (Note: an SD card is required regardless of this setting.)

6.2.2 Enable whitelist

Select this checkbox ☑ to enable plate checking against a predefined whitelist.
Once selected the whitelist options will appear in the main menu.
(see: White and Black lists later in this manual)

6.2.3 Enable blacklist

Select this checkbox ☑ to enable plate checking against a predefined blackelist.
Once selected the blacklist options will appear in the main menu.
Note that White and Black lists can be stored centrally on NVA's Back Office "Helix" and automatically synchronized with all connected cameras.

6.2.4 Retry Notifications

Select this checkbox ☑ to retry the sending of any notifications if any fail, for example due to a communications problem. You may then specify a retry time in seconds.

Retry notification time (1 - 100 seconds)

Select this to specify the retry period in seconds.

6.2.5 Low Coverage

Select this checkbox ☑ to select **Low Coverage Mode** if your camera is remote and the communication links (3g / 4g etc. for example) are regularly dropping out. When selected, events are not sent in real time to any configured Back Office or recipient (See Reporting options later in this manual). In very bad conditions this would cause a backlog of events being constantly tried.
With Low Coverage Mode selected, reads are re-transmitted after a longer interval reducing the chance of an ever-increasing backlog.
The system will therefore maintain a FIFO policy for sending reads.

Note this should NOT be used when using UTMC protocol or when using the system for access control where real time events are essential.

How retries work

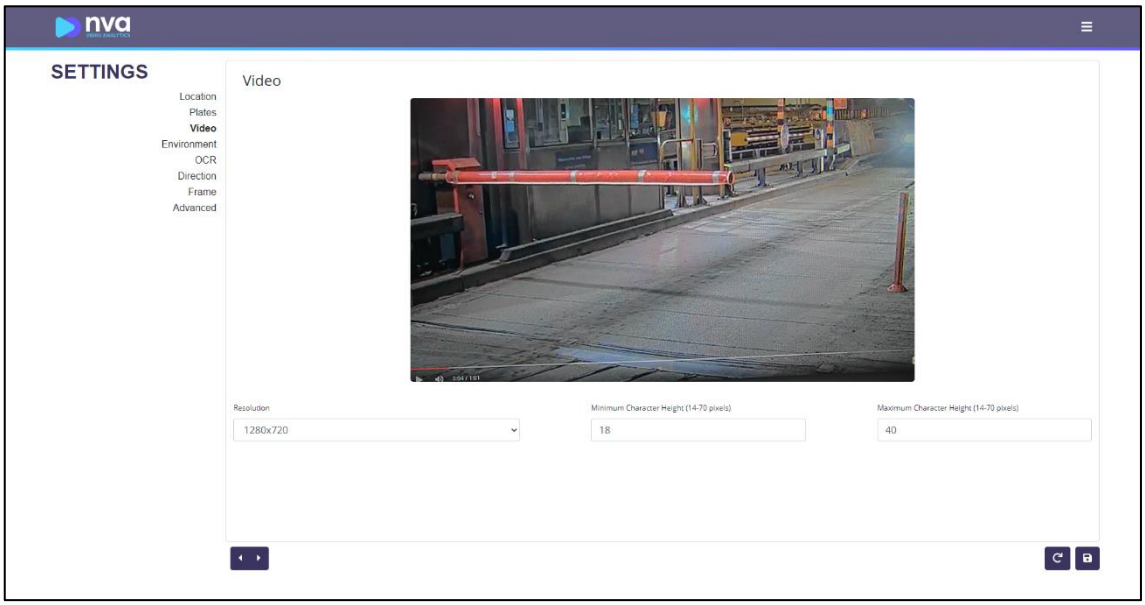
Normally the transfer process takes approximately 100ms without an image, and 300ms with a typical image. Even with the low coverage mode active, if the response from the server takes more than 5 seconds, you will get a timeout error on the camera, BUT this does not mean the data hasn't arrived at the endpoint.

Usually this is caused by the server receiving the request and processing the data **before** sending the data received acknowledgement to the client (the camera). The data is already on the server, but the camera only waits 5 seconds for the response. This can case the same data to be re-sent as the camera does not receive an OK response and the entry in the camera database is still marked as unsent. (or not received)

Check your endpoint software (back office) end ensure that responses are sent to the camera **immediately** after receiving the data before processing the data. Contact NVA for further information.

Click the Save icon to save any new settings.

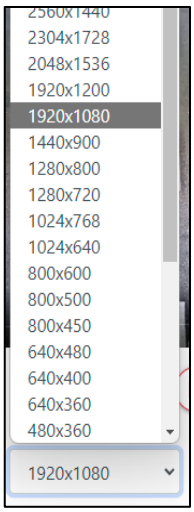
6.3 Video



This section displays real-time video based on the current settings.

6.3.1 Resolution

Setting the image resolution here overrides the camera resolution that can be configured in the camera's general video stream settings. (The App does not use a stream).
Select the desired Resolution from the drop-down list. Any changes will immediately be shown on the live display.



NOTE: when the camera is set up to read plates in a single lane then a resolution of 1024x768 or 1280x720 is sufficient. When the camera is set up to read plates in wide or multiple lanes, then a resolution of 1600x1080 (if available) or 1920x1080 is recommended. As a general rule, the ALPR software requires a mínimum of about 256 pixels per linear metre – so a 7m wide dual carriageway would require a horizontal resolution of about 7x256 = 1792 pixels – so in this case use 1920x1080.

6.3.2 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.

- Set the minimum height of the plate's characters in pixels.

NOTE: The recommended difference between the min and max heights is about 10-20 pixels.

6.3.3 Maximum Character Height (14-70 pixels)

- Set the maximum height of the plate's characters in pixels.

6.3.4 Verifying the Character Height configuration

To verify that the height settings are correct, click over the live video to show two rectangles which represent the minimum and maximum thresholds. The height of characters on the plate should fall within these two rectangles. You can drag these rectangles around the screen to where your target plates are.

Click the Save icon to save any new settings.

6.4 Environment

6.4.1 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.

6.4.2 Multiplate Frame

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.

6.4.3 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. Note that if you require the direction to be reported or filtered, then a value of more than 1 is necessary.

6.4.4 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).

6.4.5 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 800ms or more 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.

6.5 OCR

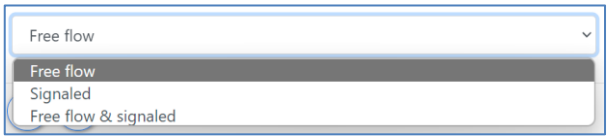
6.5.1 OCR complexity

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) or plates are proving difficult to read due to size or condition.

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

6.5.2 Working Mode



Select the appropriate option from the drop-down list. There are three options:

- Free flow: The system continuously analyzes the video and reports plates when detected. This is the normal mode of operation.
- Signaled: The system only analyzes the video when a trigger is received.
- Both

Free flow is the normal mode of operation and the engine will continuously look for plates.

If Signaled is selected, a port may be specified (physical or virtual) and a delay can be set. This causes the App to wait after receiving the trigger before analyzing the frame. See below.

- Specify whether the selected **Port** is virtual or physical.
- Specify if only one plate result is to be sent.
  This applies to images that contain multiple plates, - in this case the App will return the most confident plate read.
- If when triggered, no plate is found in the field of view, then you can specify if the word 'NONE' should be transmitted at this point.

Signaled Mode

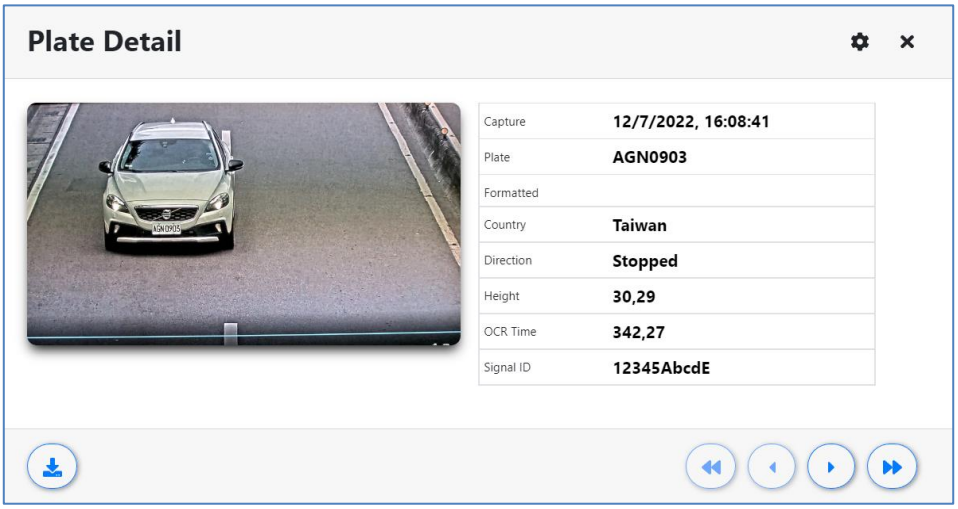
You might use signaled mode in high security scenarios when you are able to detect a vehicle (by a loop or beam for example) and you want to capture an image even if there is no plate or a damaged or disguised plate; in this case you could use a physical port.

In parking scenarios a PTZ camera could be moved to each parking bay and the ALPR triggered from the camera. The App would then attempt to read a plate and save/send the result to a parking back office. A virtual port would be used in this case.

In signaled mode, if the software cannot find a plate in the image it will return the plate as "NONE" along with all the normal metadata including the id of the signaling source.

There are three ways of triggering the software:

1. **An HTTP request to the App.**
   Write to the address of the camera as follows:
   http://CAMERA_IP/local/Vaxreader/trigger.cgi?id=12345AbcdE
   ..where `id` is optional and can be any string. This will trigger the LPR and links the image with the id. This id will be stored in the plates table in the database and it is included in the Vaxtor protocol TCP/IP message as **$signalid$**



2. **A electrical signal received via one of the camera's I/O ports**
   A physical port can be configured to detect an electrical pulse. See Port below.

3. A virtual port trigger received from the Axis camera.

A remote program – or an internal event can call, for example:
http://camera_ip/axis-cgi/io/virtualinput.cgi?action=6:/500

This will trigger virtual port 1 for 500ms.
(6 is virtual port 1, 7 is virtual port 2)

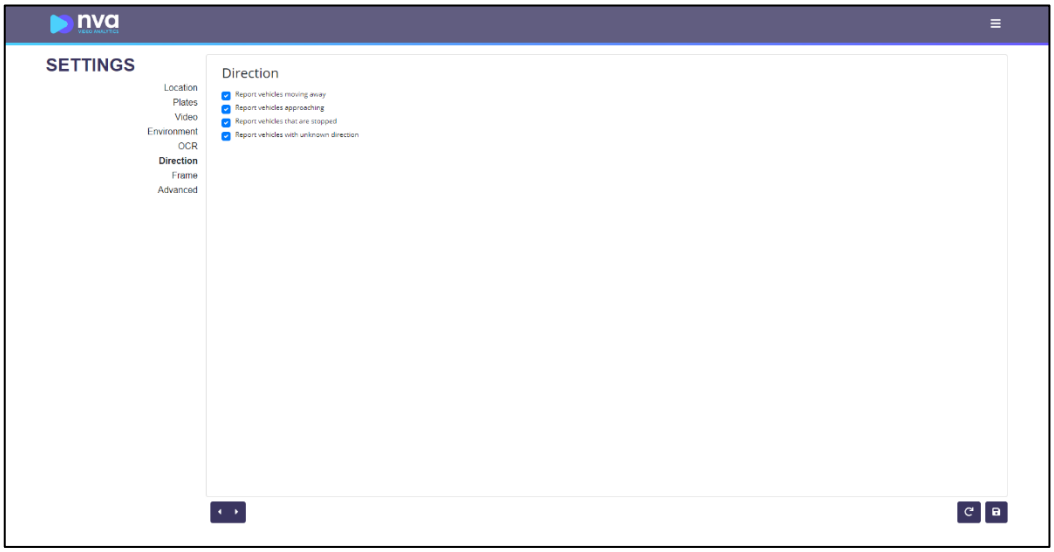
Port

The port is the camera port which can be a physical input port (usually 1 or 2 depending on the camera model and the number of ports available), or it could be a virtual port – which could be 6 or 7. *(6 is virtual port 1, 7 is virtual port 2).*

Click the Save icon to save any new settings.

6.6 Direction

This section contains Vehicle Direction filters



If the If 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 manoeuvring (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.

Note that the software works by looking at the size and position of each plate read and so the camera should be elevated from the traffic for more accurate reporting.

Select all three of these options for normal usage.

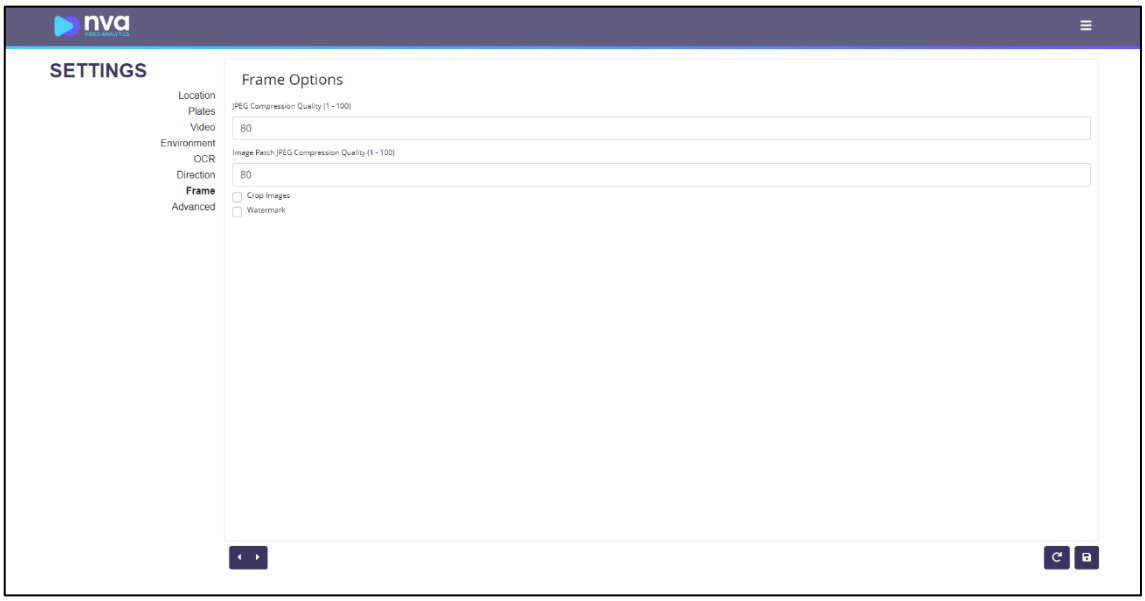
You can also choose to detect stopped vehicles using this feature. Deselect the other options and select "Report vehicles that are stopped" and make sure that the minimum reads is set to a high number, say 10-20 and the OCR timeout to say 2 seconds. If the OCR time is taking about 200ms per read then if the plate stops for 2 seconds then it will be reported.

This can be used to detect stopped traffic in bus lanes or yellow boxes for example.

Click the Save icon to save any new settings.

6.7 Frame

Here you can determine the size of the saved / reported images.



6.7.1 JPEG Compression Quality

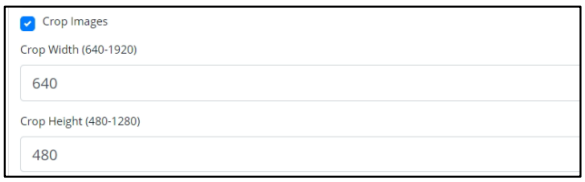
Select the required JPEG compression ratio for the saved images (the full image). The lower the number, the higher the compression ratio (and smaller the image size) but the quality of images will be lower. 80 is a good compromise.

6.7.2 Image Patch JPEG Compression Quality

Select the required JPEG compression ratio for the saved images of plate patches (the image of just the plate). 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.

6.7.3 Crop Images

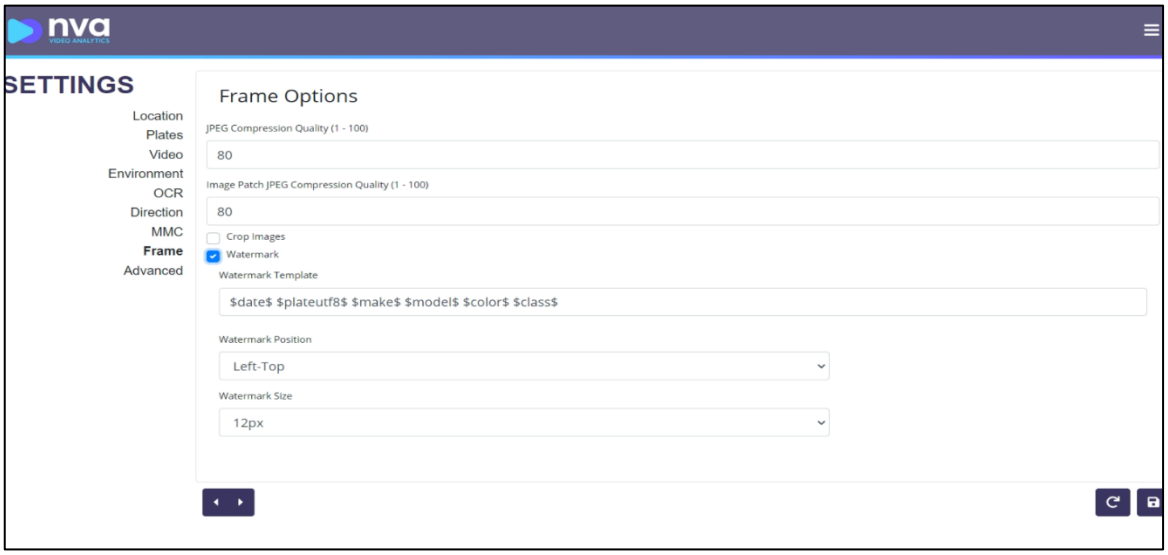
In the case of a restricted size you should use the 'Crop Images' setting.



This will crop an area around the license plate to apply the compression to, this is better than over-compressing the whole image which will result in a very low-quality result.
Specify the width and height to crop to.

6.7.4 Watermark

When still images are saved or transmitted to Helix or some other device using one of the other reporting options then this Watermark option can be used to write for example the plate text and date onto the still image being sent.

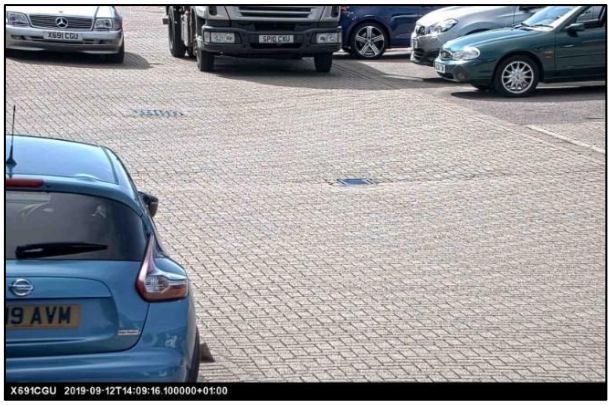


The watermark template field allows you to insert dynamic text that will be overlaid onto the still image of the captured plate. Choose from the following list in the chapter Dynamic Text Replacement Reserved Words.

See note on UTC format: Here:

In the example below we are using the $plate$ and $date$ fields.

Next select the position of the watermark from the four options available and finally select the font size required. All saved images will now have this information burnt into the still images of the plate capture.

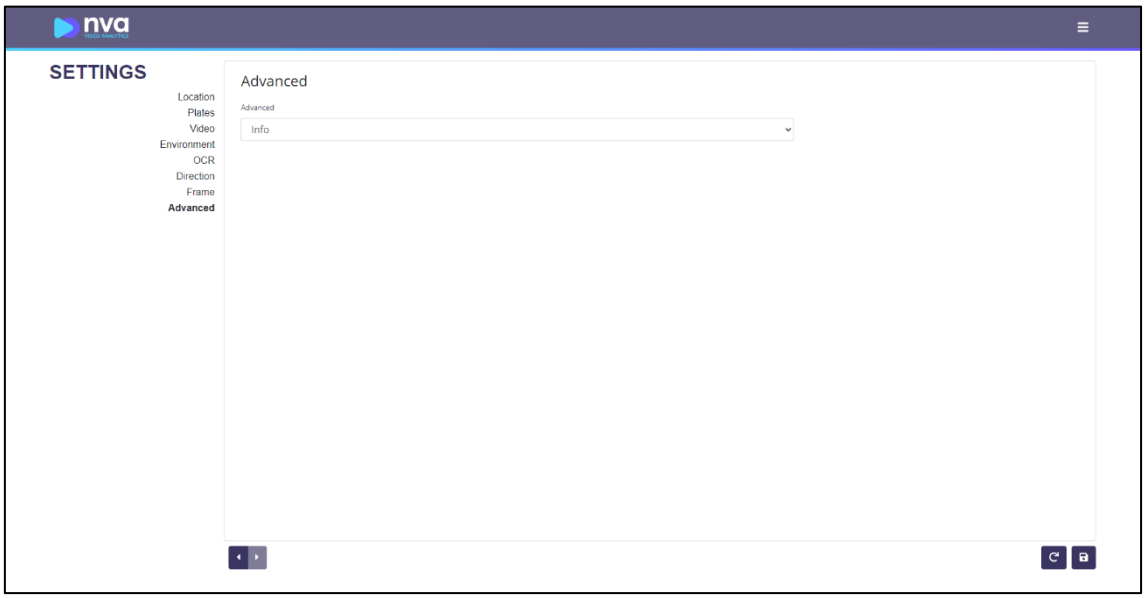


Click the Save icon to save any new settings.

6.8 Advanced

Advanced settings

Use this only on instruction from NVA only to configure diagnostic information.



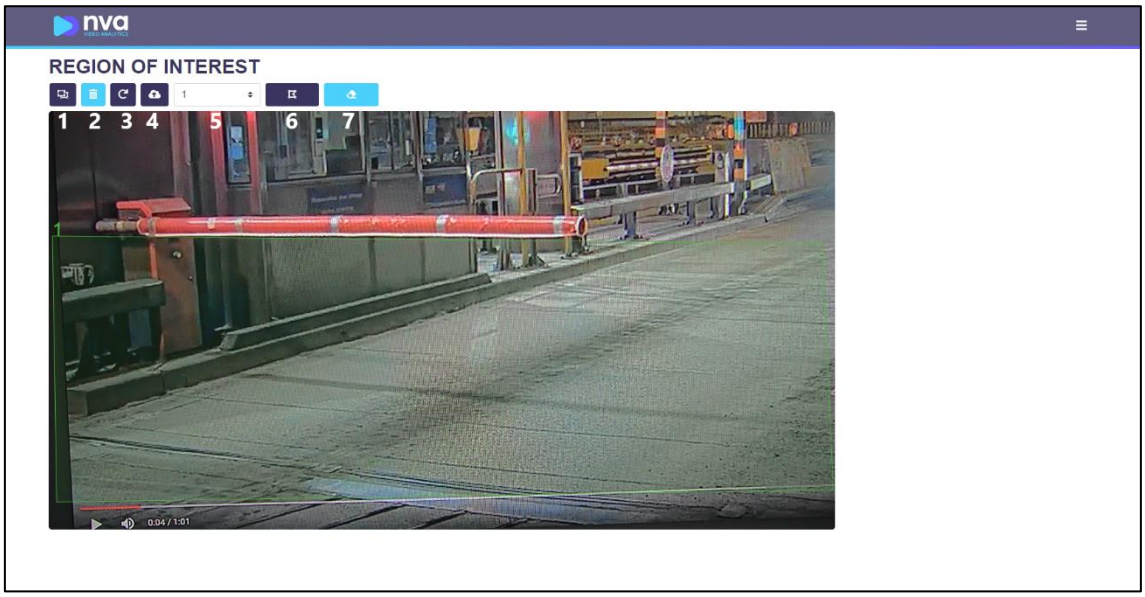
Click the Save icon to save any new settings.

7. 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 as in the example below, the ROI can be used to limit the OCR to the area near to the camera thus reducing the processor load.

If 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 a crop zone to exclude this part of the image.
Each ROI must be given a unique numeric Identifier

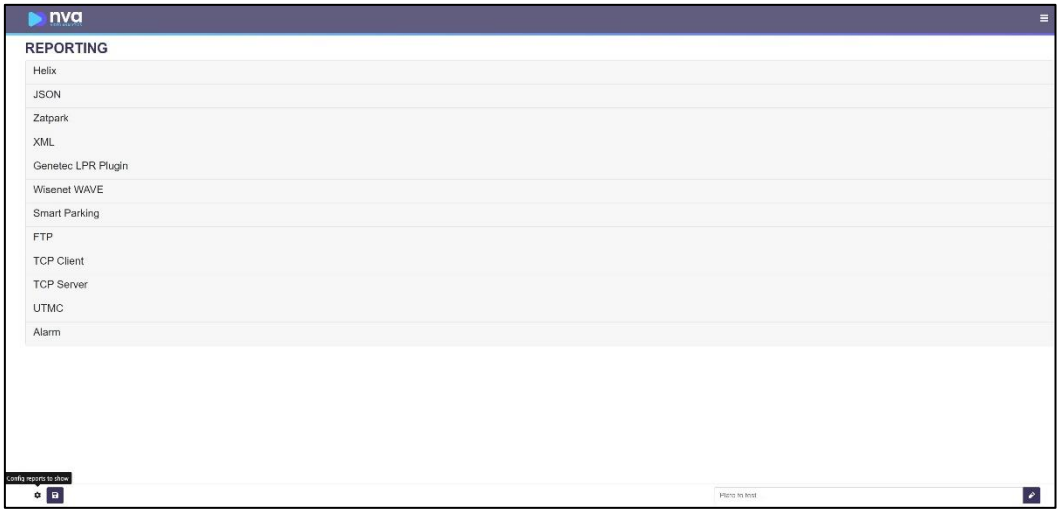


The icons from left to right work as follows:

1. Add a new ROI: Select to start defining a new region of interest
2. Remove all ROIs: Select to delete all ROIs
3. Reload ROIs: Select to reload all saved ROIs
4. Submit ROIs: Select to save the current ROIs to the camera's internal memory
5. Select ROI ID: Select the ROI unique Identifier for each ROI defined
6. Edit ROI: Select to edit the ROI by moving the polygon points
   (note: it is often simpler to delete the ROI and start again)
7. Remove ROI: Select to delete the selected ROI

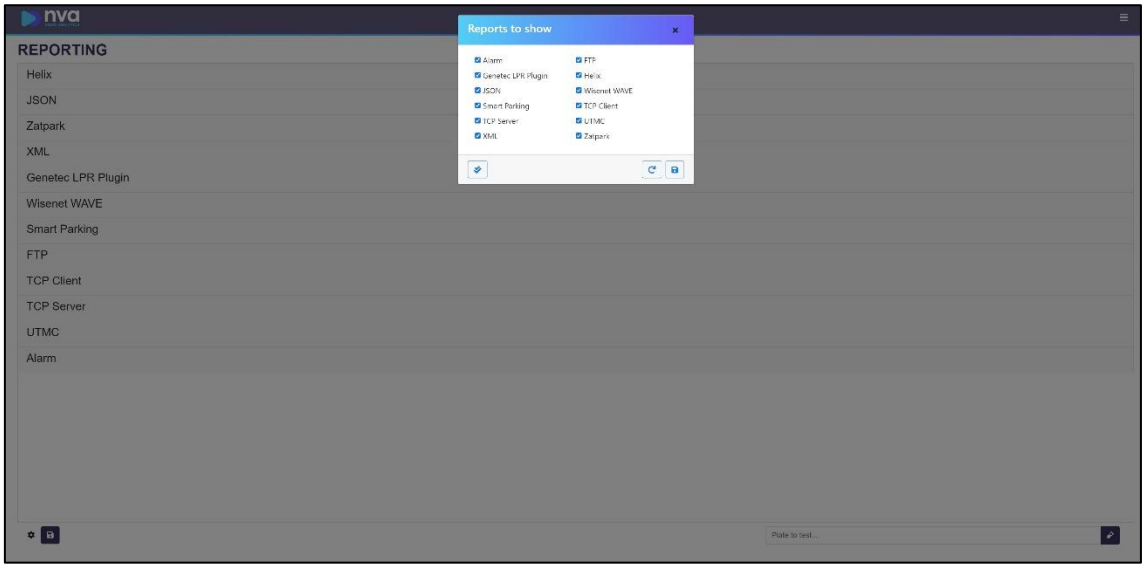
8. Reporting

NVA's ALPR App 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 NVA's powerful Back Office - Helix, which can accept and store plate reads in real time from hundreds of Hanwha Vision 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.

To expand this list, click the gear icon (bottom left) to display a list of optional reports.



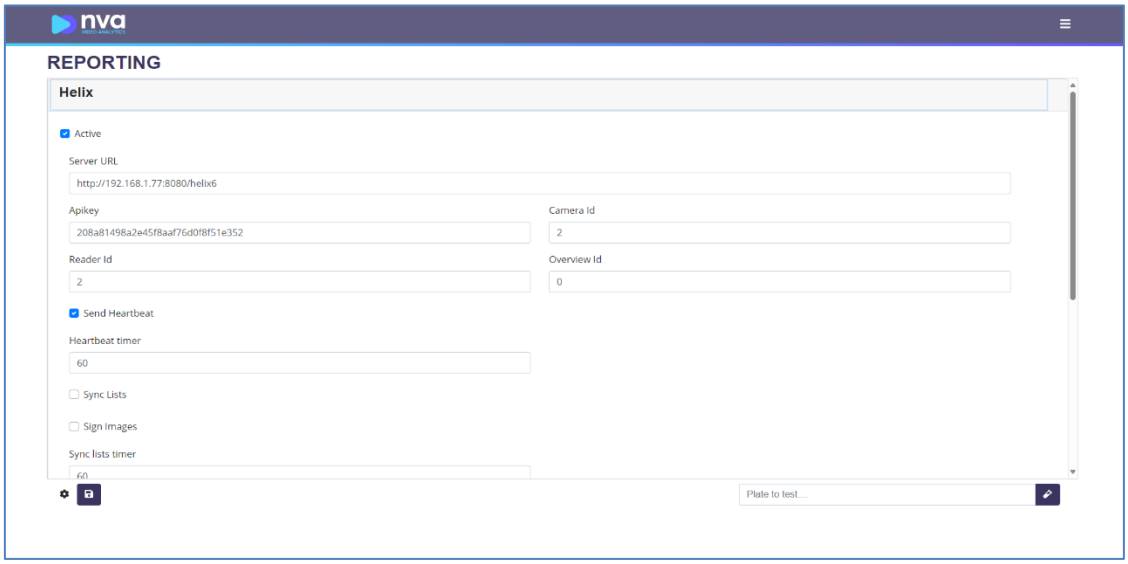
Select one or more from the list and the Save using the disk icon.

Use the icon to select **All** the options, the icon to reset all the options and to save the options. The additional reporting options will then appear on the main display.

8.1 Reporting to Helix

Helix is NVA's powerful back office and which can connect to hundreds of cameras simultaneously and store millions of plate records and images. Helix allows complex searches and can be used to control car parks, trigger relays to open barriers and check vehicles against lists and perform actions.

The data sent to Helix is encrypted and in this case Helix will support different time zones.



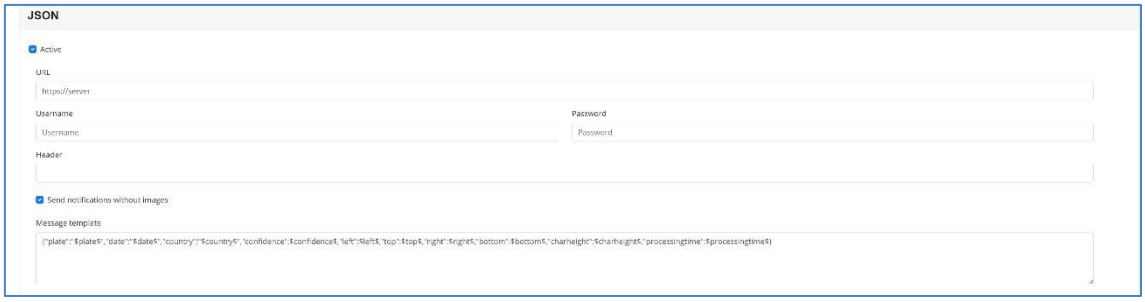
Select the Active checkbox ☑ and enter the IP address (URL) of the receiving PC or server.
E.g. **10.0.0.12:8080/helix6**
Note that this can be an http or an https address supporting data encryption.

1. Camera and Overview Camera ID: Enter the Camera ID to be sent to Helix along with the Overview ID to be used for an associated Colour Overview camera. Here you can specify an API key (generated in Helix) to be used for authentication.
2. Heartbeat: Select 'Send Heartbeat' if you with your camera to be monitored from Helix and specify a timer in seconds.
3. Sync Lists: Select this option to synchronise black and white lists stored centrally on Helix with the local lists stored on the Hanwha Vision camera. This is useful on mission critical sites if there is possibility of a comms failure. In his case the local lists will be used and updated from the central copies when the comms are restored. Enter a timer below as the interval to synchronise the lists.
4. Sign Images: If Sign images is activated, the images that are sent to Helix are sent with and SHA tag (Secure Hashing Algorithm). If the images are subsequently modified in Helix the user will be notified..

Click on the **Submit reporting** button to store the information in the camera.

8.2 JSON

This option configures a JSON output from the camera.
JSON stands for 'JavaScript Object Notation' and is a lightweight format for storing and transporting data. It is a common standard and is easy to understand.

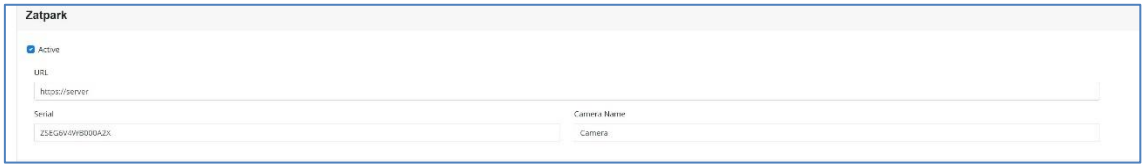


Select the Active checkbox and enter the IP address (URL) of the receiving PC or server.

Enter your prescribed user name and password followed by the required message template.

8.3 ZatPark Reporting

The NVA App has an pre-configured direct reporting option to the ZatPark's parking management system.

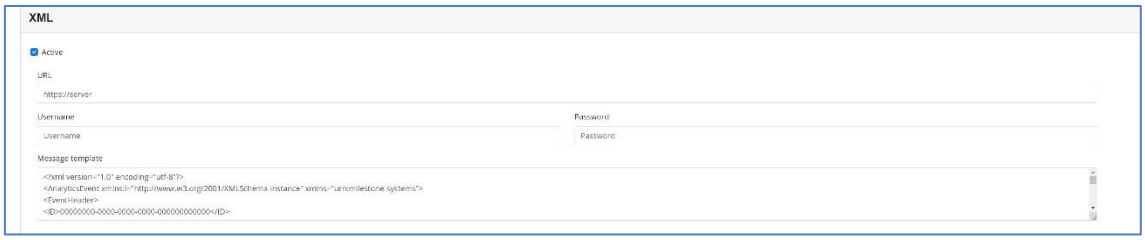


Select the Active checkbox and enter the IP address (URL) of ZatPark's receiving server.

Enter your prescribed Serial number and camera name. (consult ZatPark for details). The message template has been pre-defined and that's all you have to do.

8.4 XML Output

XML stands for 'Extensible Markup Language' and lets you define and store data in a shareable manner.

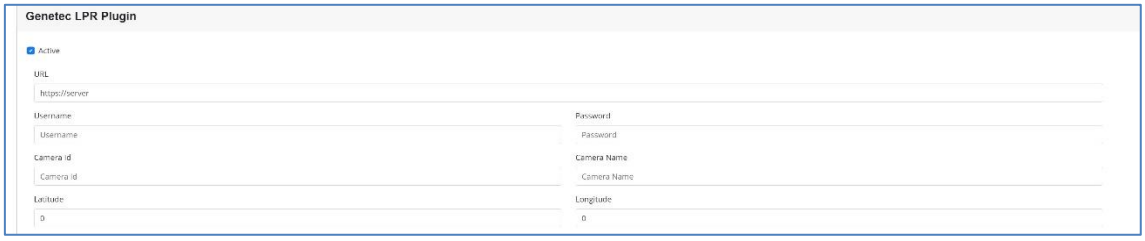


Select the Active checkbox ☑ and enter the IP address (URL) of the receiving PC or server.

Enter your user name and password followed by the required message template. The default template has been configured to facilitate sending plate reads to Milestone.

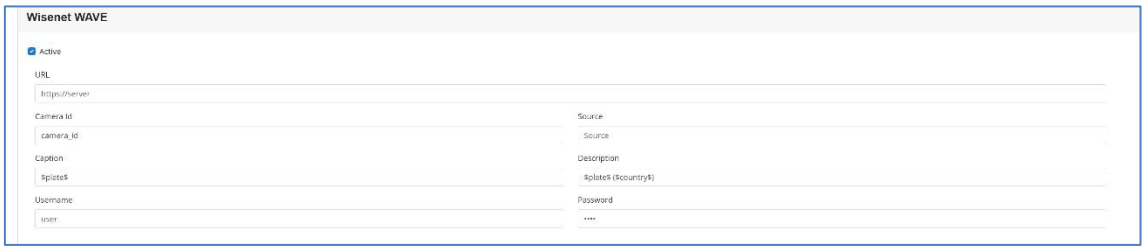
8.5 Genetec LPR Plugin

Select this option to send plate reads to Genetec Security Centre.



8.6 Wisenet Wave

Licence plates can be read and sent to Hanwha's powerful IP Video management platform, Wisenet Wave, where they are inserted into the video stream as bookmarks allowing users to search for vehicle events within any recorded video.



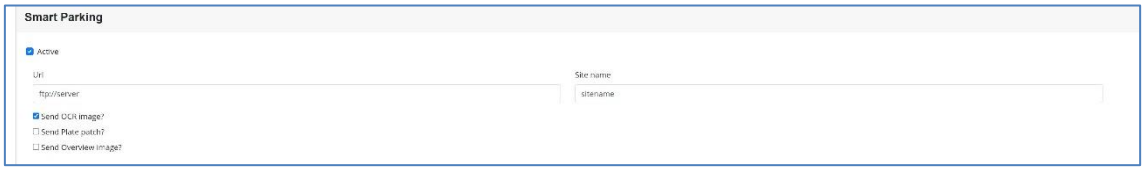
Select the Active checkbox ☑ and enter the IP address (URL) of the receiving PC or server.

Complete the other parameters as follows:

1. Camera ID: Enter the required reporting Camera ID
2. Source: Enter the source parameter as detailed in Wisenet Wave
3. Caption: Enter the required reporting Caption template
4. Description template: Enter the required reporting Description template
5. Username: Enter the Wisenet Username
6. Password: Enter the Wisenet Password

8.7 Smart Parking

Licence plates can be read and uploaded to one of Smart Parking's servers using FTP protocol.



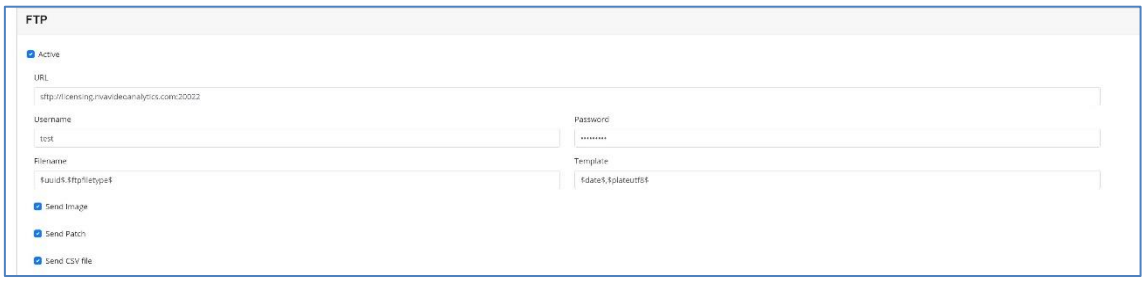
Select the Active checkbox ☑ and enter the FTP address (URL) of the receiving PC or server.

Complete the other parameters as follows:

1. Site name: Enter the required site name
2. Send Image: Select to upload the ALPR image
3. Send Patch: Select to upload the Plate Patch
4. Send Overview Image: Select to upload the associated overview image if available (Contact NVA for more details)

8.8 FTP / SFTP

FTP stands for 'File Transfer Protocol' is a way to upload data from one location to another on the Internet and between computer systems. SFTP is a secure file transfer protocol that uses shell encryption to provide a high level of security when sending and receiving files. This reporting option can be used to send to either.



Select the Active checkbox ☑ and enter the FTP or SFTP address (URL) of the receiving PC or server.

Complete the other parameters as follows:

1. Username: Enter the Username if required
2. Password: Enter the Password is required
3. Filename: Filenames can be constructed using dynamic replacement words
4. Template: Enter the data to be uploaded (again using dynamic replacement words if necessary)
5. Send Image: Select to upload the ALPR image
6. Send Patch: Select to upload the Plate Patch
7. Send CSV file: Select to upload a CSV file of the plate read

8.9 TCP Client

When using Transmission Control Protocol, normally written TCP/IP, a TCP client initiates a connection request to a TCP server in order to setup a connection with the server. A real TCP server can accept multiple connections on a socket.

Select the Active checkbox ☑ and enter the IP address receiving PC or server and Port number to use. Next define a message template using dynamic text replacement.

8.10 TCP Server

The Hanwha camera can be configured as a TCP Server.
Once set up, multiple clients can connect to the configured port in order to receive data. The camera will send a configurable string data type to all of the connected clients.
The connection will remain open until it is closed by the camera if there is a configuration change.

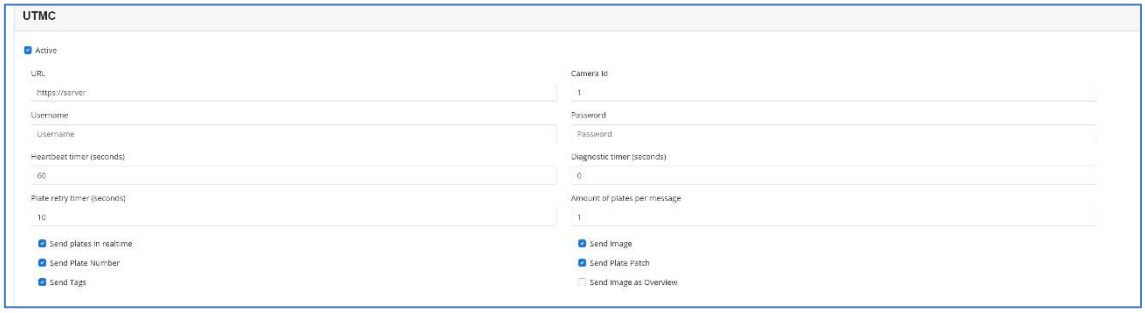
Select the Active checkbox ☑ and enter the IP address (URL) of the camera and Port number and define a message template using dynamic text replacement.

Click on the **Submit reporting** button to store the information in the camera.

8.11 UTMC

Choose this reporting option if you want the NVA application 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.

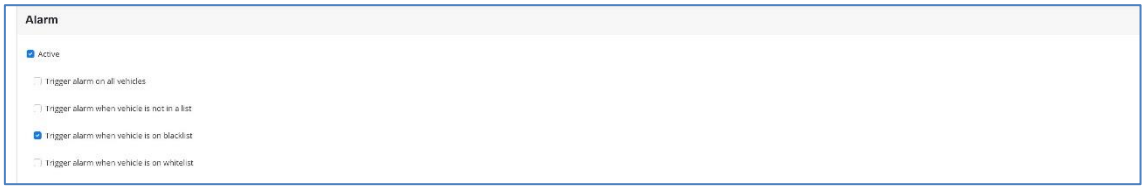


1. Select the Active checkbox ☑ and enter the URL of the receiving server.
2. Enter the **Heartbeat and Diagnostics** intervals to monitor the connection.
3. Enter a Camera **ID** (unique identifier for each camera).
4. All other fields are self-explanatory and define what data is transmitted to the 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.

Click on the **Submit reporting** button to store the information in the camera.

8.12 Alarm

This function is used to operate the inbuilt relays in the Hanwha Vision camera and trigger a local alarm or open a barrier.

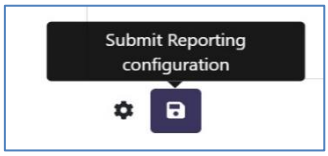


1. Select the Active checkbox ☑ to activate Alarm Reporting
2. Trigger alarm on all vehicles: This always triggers the relay when a vehicle approaches
3. Trigger alarm when vehicle is not on a list: Used to identify unknown vehicles
4. Trigger alarm when vehicle is on blacklist: Used to alert if on a watch list
5. Trigger alarm when vehicle is on whitelist: Used to open a barrier for known vehicles

See Hanwha Vision camera documentation for help on configuring and using the camera relays.

8.13 Submit Reporting Settings

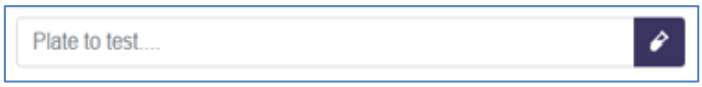
Once you have configured your reporting options then remember to save them by pressing the Submit button at the bottom of the menu.



8.14 Testing Reporting

After configuring a reporting option, it is possible to simulate a plate read transmission. This feature can be used to confirm that the notification has been set up and is operating correctly.

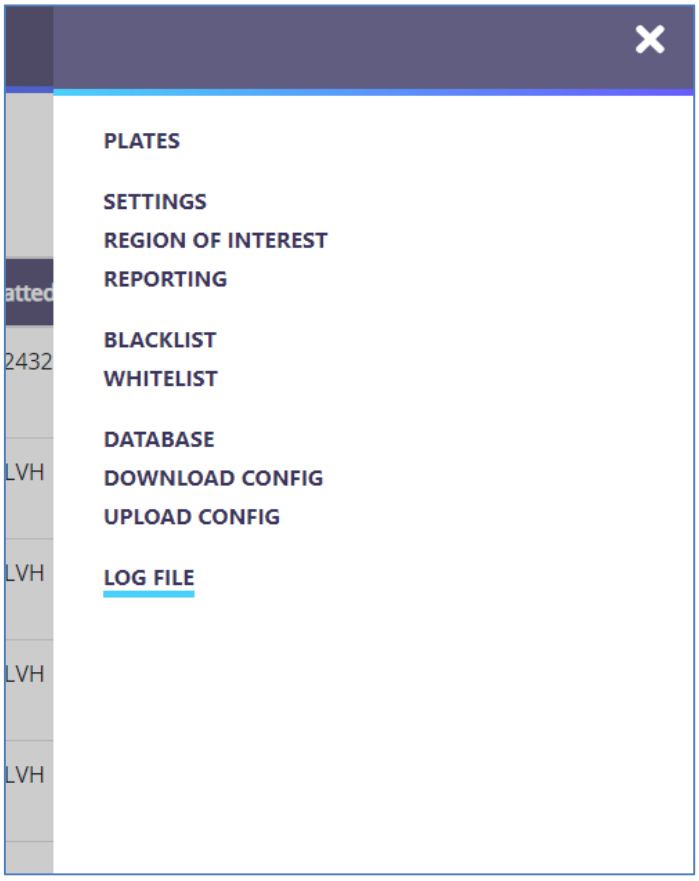
To simulate a plate read notification in Reporting:
At the bottom of the page, insert a plate number on the “Plate to test” textbox.
Click on the Test reporting icon:



The text you type is send as a plate along with an image of whatever the camera is pointing at. You can check if the date was sent without errors by checking the Log File which monitors all App activity. See Log File section later in this guide.

9. Log file

The Log file function displays the current System Log for debugging and testing purposes.



Note that the latest information is added to the bottom of the file so use the slider bar on the right to navigate up and down.

Use the '**Scroll down'** button to move to the end of the file.

If new data is being recorded whilst you are browsing, then use the '**Reload'** button to re-open the latest version of the file.

Error messages will appear here including if the program has failed to send data to a third-party application for some reason – or it has been rejected by a server.

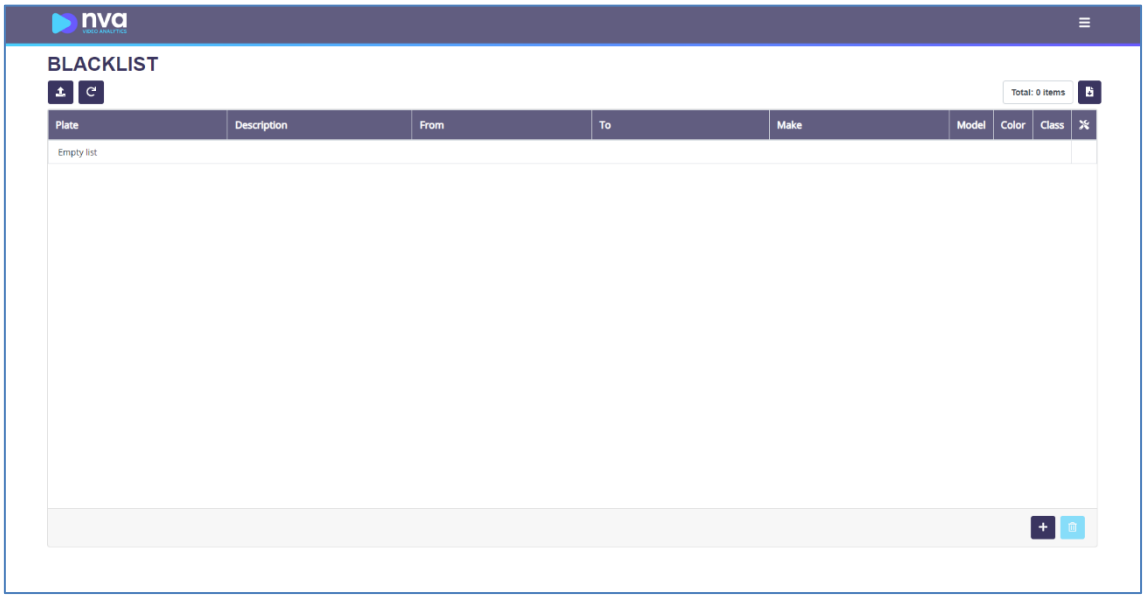
Basic plate data includes the plate height, number of reads, time to process etc.

Use the Download button to download the complete log file from the camera.

10. Blacklist

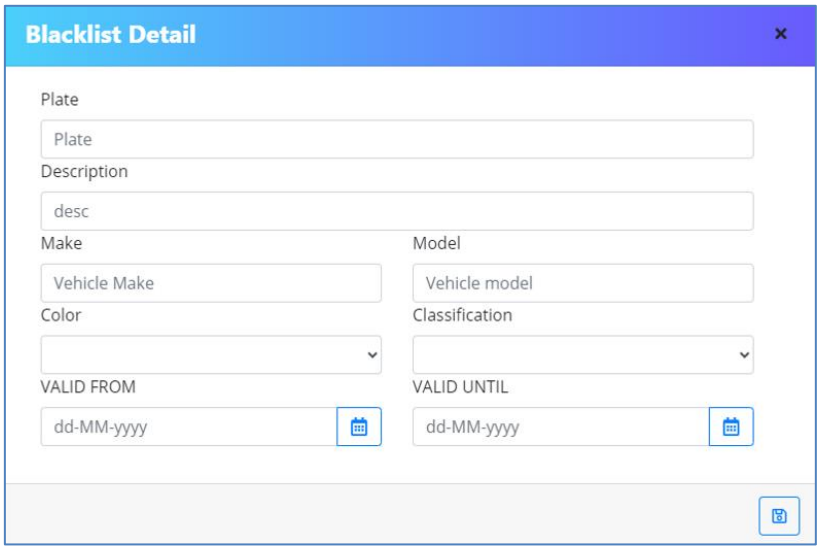
Select to view and manage the on-camera blacklist.

10.1 Main Page



1. Upload: Select to upload a CSV file to the list.
2. Reload: Select to reload the displayed list items.
3. Add: Select to add a new plate item to the list.
4. Download: Select to download the current list as a CSV file.
5. Edit: Select to edit the line item.
6. Delete Item: Select to delete the line item.
7. Delete All: Select to delete the entire list.
8. Save List: Select to save the list items to the camera – **note: only when a list is saved is it active in the camera**
9.

10.1.1Adding and Editing line items

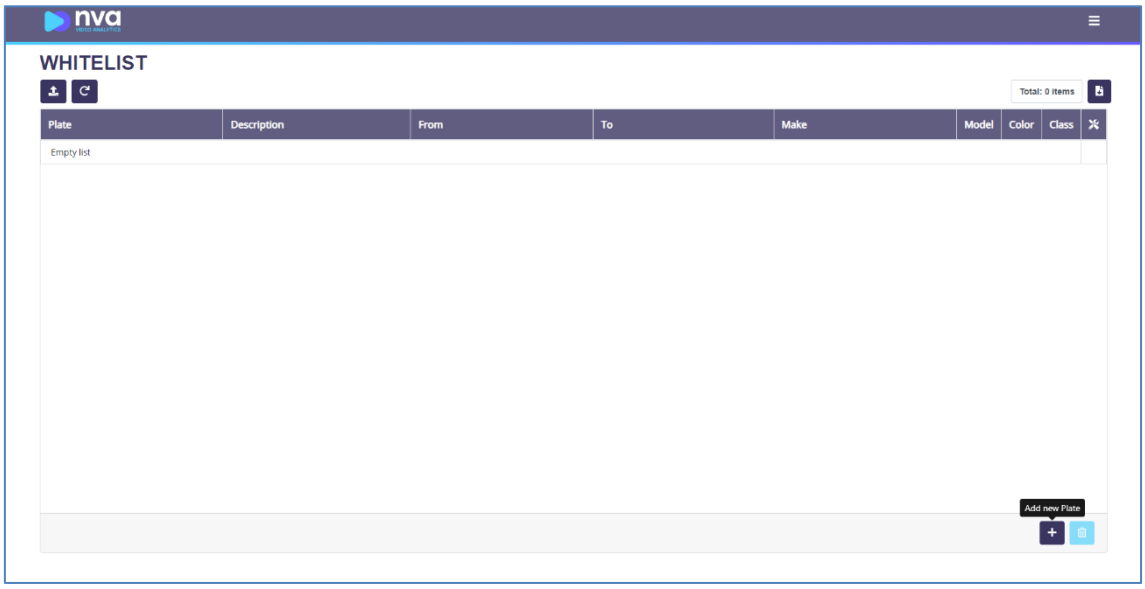


1. Plate: Enter the vehicle license plate.
2. Description: Enter the vehicle description.
3. From: Enter the License Plates start date and time.
4. To: Enter the License Plates end date and time.
5. Cancel: Close the window to cancel the changes.
6. Save: Select to save the item to the camera.

11. Whitelist

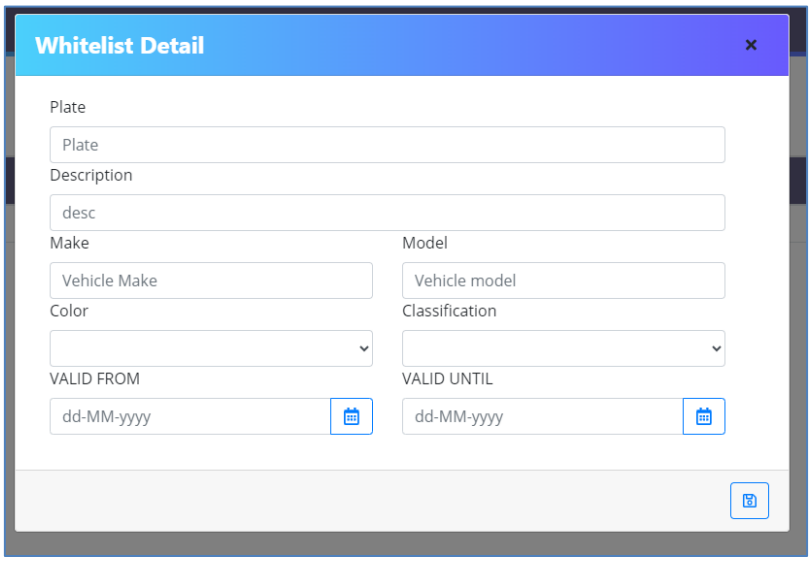
Select to view and manage the on-camera whitelist.

11.1 Main Page



1. Upload: Select to upload a CSV file to the list.
2. Reload: Select to reload the displayed list items.
3. Add: Select to add a new plate item to the list.
4. Download: Select to download the current list as a CSV file.
5. Edit: Select to edit the line item.
6. Delete Item: Select to delete the line item.
7. Delete All: Select to delete the entire list.
8. Save List: Select to save the list items to the camera – **note: only when a list is saved is it active in the camera**

11.1.1Adding and Editing line items

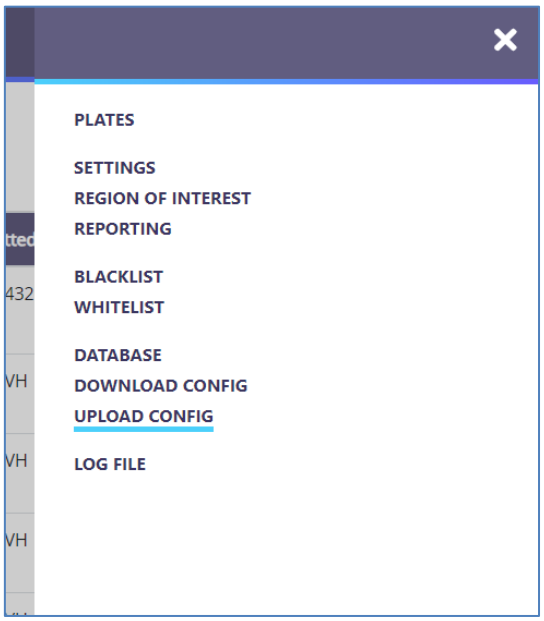


1. Plate: Enter the vehicle license plate.

2. Description: Enter the vehicle description.
3. From: Enter the License Plates start date and time.
4. To: Enter the License Plates end date and time.
5. Cancel: Select to cancel and close the screen.
6. Save: Select to save the item.

12. Upload Config

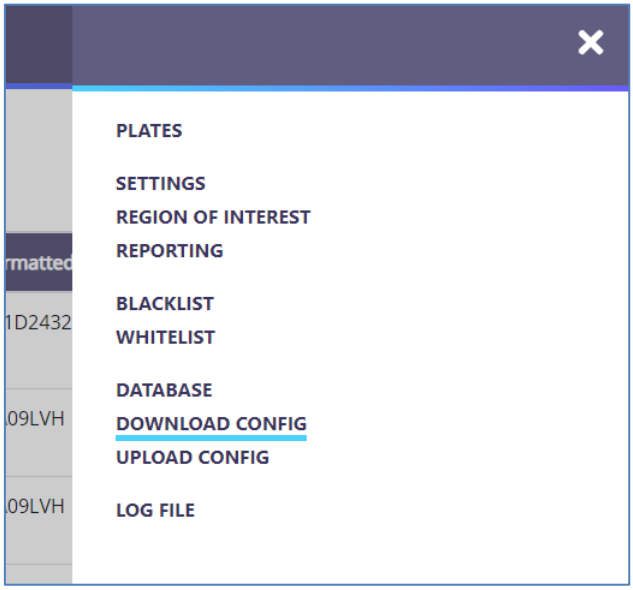
Select and browse to a previously exported configuration (.JSON) file to import all the App settings.



13. Download Config

Selecting will create and download the current App configuration file in .JSON format

This can be used as a backup or a quick way to copy a configuration to another camera.



14. Troubleshooting

Many license plate reading issues are caused due to:

- 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.

14.1 The NVA ALPR On-Camera software starts and then stops suddenly.

Solution:

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

14.2 The NVA ALPR On-Camera license is valid but a 'Check license' message appears.

Solution:

Check that the date and time is set correctly.

14.3 The NVA ALPR 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 rule, if you can't easily read the plates then the software won't be able to read them either!
'Image quality 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, do not select 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 back one by one.

14.4 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:

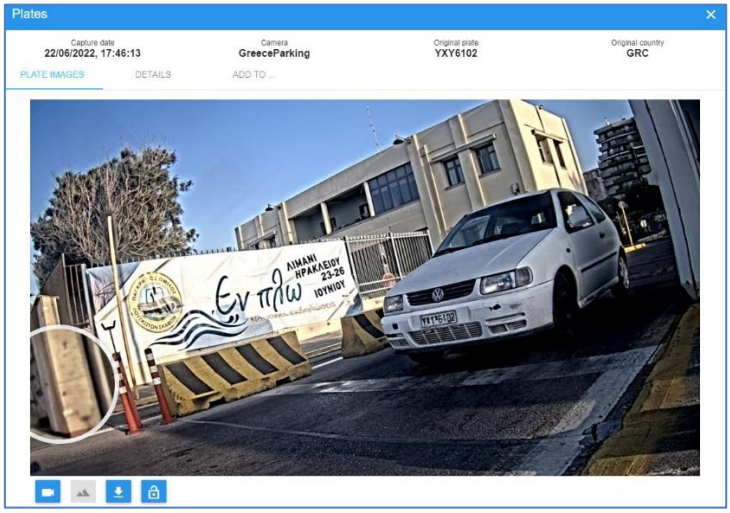
Adjust the exposure in the camera, possibly by decreasing the shutter speed (e.g. to 1/2000th sec). If this is a night-time shot, try reducing the IR illumination

The license plates appear blurred:

Solution:

Try adjusting the focus or shutter speed of the camera.

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, too dark 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. In this case the camera's day/night mode has been set incorrectly and it has not yet switched to night mode where IR illumination would make the plate more visible.

14.5 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 in the main Hanwha Vision setup.

15. 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.
- **$confidence$**: 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.
- **$multiplate$**: Amount of times that the plate has been read before reporting.
- **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.
- **$epoch$**: 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)

15.1 Note on UTC time format:

Time UTC: 2021-04-13T00:50:15.000Z
(YYYY-MM-DDTHH:MM:SS.mmmZ - The last Z indicates the time is UTC)

Local Time: 2021-04-13T00:50:15.000-03:00
(YYYY-MM-DDTHH:MM:SS.mmm±hh:mm - Where the last ±hhmm is the difference from UTC time)

16. Changelog

[v1.29] - 2024-11-13

- Allow ML-200 operating seamless when any country from the input list is DL supported (like Brazil)
- Update Brazil grammar
- Improves vehicle analytics in close-up situations
- Update MEA data-file
- Update vaxdnn
- Include Israel and Jordania in MEA regional file

[v1.28] - 2024-10-31

- Bug fix, MNN shape size and dimensions to calculate only with plate detector
- Bug fix, disable vehicle analytics tracing times in release
- Dynamic control of the normalized image size
- Fix grammar from Nebraska
- Resolve reading 2 stuck plates (trailers) in ML300
- Fix DNN image normalization in vehicle fine cropper
- New API function to provide advanced parameters configuration
- DNN object properties can be updated from the factory
- Accuracy improvements in vehicle analytics
- Add new advanced parameter (same plate timeout)
- Restore DL plate detector model
- Multi-model support according to the OCR complexity
- OCR complexity is no longer an advanced params but part of the initialization
- Including off-screen boundaries plate detection
- Allow combination of Singapore, Malaysia and Thailand
- Add JPEG metadata info
- Image buffer to a temp directory was changed
- Reboot manager was implemented (It reboots the camera at 2am)
- Log level to error by default
- The log initialization changed to write less log as possible at the starting

[v1.27] - 2024-09-20

- MMC is protected against average characters height equal or minor than 0

[v1.26] - 2024-08-30

- First NVA Hanwha version with certificate and key