Synology®

Administrator's Guide for
License Plate Recognition

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Based on
Synology Surveillance Station 9.0.0

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Introduction

With its powerful AI Image Analysis, Synology Deep Video Analytics (DVA) can instantly calculate large amounts of object attributes, filter out environmental interference, and deliver accurate detection results. Backed with Smart Tag technology and a comprehensive management interface, it allows users to take control of events with ease and efficiency.

Among the supported algorithms, License Plate Recognition specializes in detecting vehicles license plates when vehicles have entered a specific area. To accommodate different scenarios and security levels, you can track and customize your own trigger times.

For you to achieve optimal precision, this guide aims to introduce the key factors of setting up License Plate Recognition in People and Vehicle Detection tasks. For best results, please follow the listed points as closely as possible.

System Requirements

• Surveillance Station version 9.0.0 or later.

• Synology's Deep Learning NVR. (Synology Deep Video Analytics—also known as DVA—installed by default).

Note: No additional licenses required for People and Vehicle detection.

Quick Camera Installation

Step 1　Select Appropriate Camera

Stream Quality　1920x1080@20 FPS or above

Sunshield　(Optional) Added to outdoor cameras to avoid direct sunlight on the lens

Step 2　Check Installation Environment

Minimum Illumination　300 lux
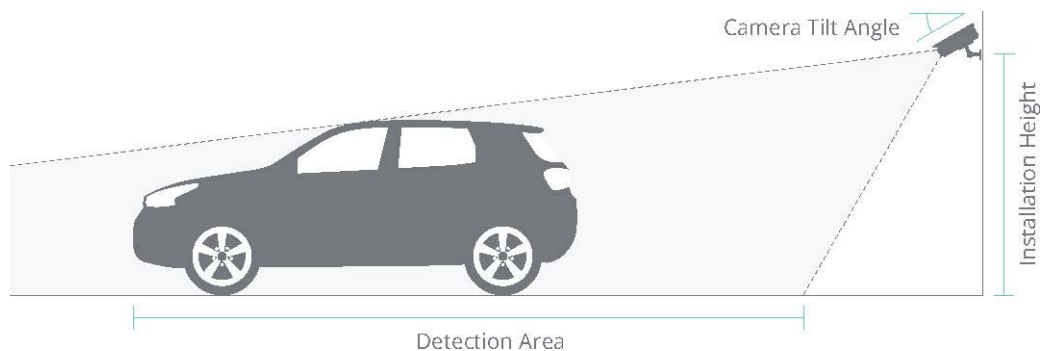
Step 3　Mounting Height and Angle

Installation Height　3 - 10 meters
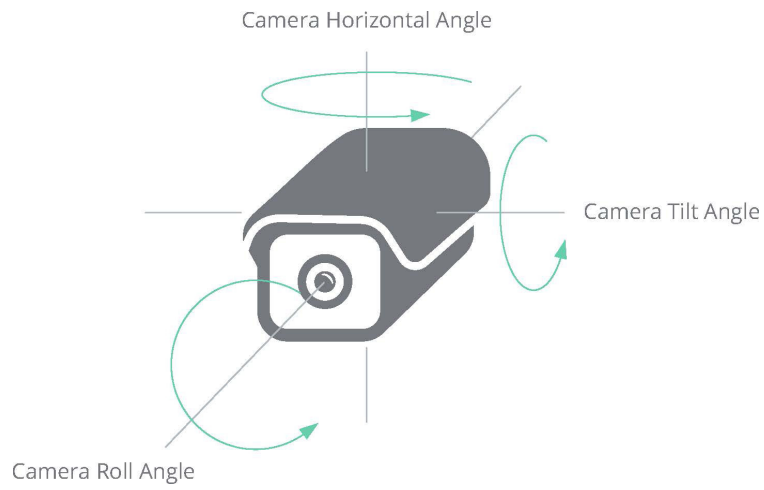
Camera Tilt Angle　15 - 30 degrees

Horizontal Angle　25 degrees

Camera Roll Angle　25 degrees

Detection Area　7 meters – 20 meters

Camera Tilt Angle

Installation Height

Detection Area

Camera Horizontal Angle

Camera Tilt Angle

Camera Roll Angle

| **Camera Roll Angle**	**Camera Horizontal Angle**	**Camera Tilt Angle**
Below 25 degrees	Below 25 degrees	Below 30 degrees

Position the Camera

When you mount the camera for License Plate Detection, it is important to get a good, clear view of the area of interest so the plate can be detected consistently. This ensures accurate reading and minimizes false detection. The following are methods to best position your camera:

• Avoid objects blocking the camera's field of view such as pillars, barriers, fences, gates, trees, etc.

• Avoid irrelevant moving objects such as people or traffic.

• Mount the camera as close as possible to the area of interest.

• Adjust the camera angles for optimal detection.

• Use the camera's optical zoom, if applicable.

• Mount the camera so the license plate appears from the top of the image (or bottom if traffic is driving away from the camera) instead of from the right or left side. In this way, you make sure that the recognition process of license plate only starts when the whole plate is in the view.
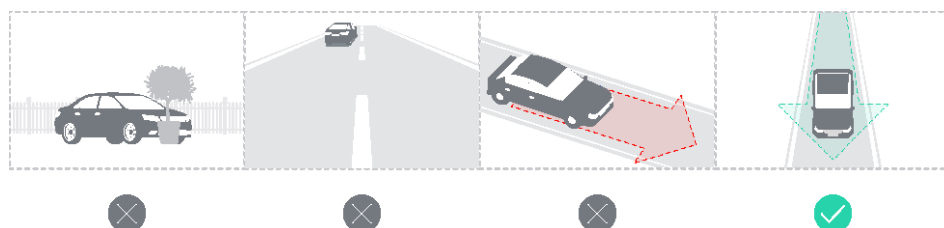
Ensure Detection Accuracy

A suitable camera placement and envinoment can ensure the detection accuracy. The following situations can affect detection by the AI:

- Light shining directly into the camera's lens may leave streaks in the images or cause overexposure, affecting the picture quality.

- The camera installed in areas where drastic changes in lighting can happen can lead to inconsistent picture quality.

- Overexposed or underexposed license plates images can impede recognition by the AI.

- Backgrounds with yellowing lighting can impede recognition by the AI; white lighting is recommended.

- Vehicle moving too fast might cause captured license plates images to blur.

- Changes in the camera's field of view might affect the video analytic results (e.g., changes in focus or zoom level).

- Weather sometimes affects the clarity of outdoor cameras. Rain and snow, changes of shadows, or differences between day and night can have an impact on detection and recognition.

- An unstable network connection might lead to incomplete or corrupt images. Wired connections are highly recommended.

- Dust, insects, or other stains can block the lens. Keep the lenses clean so that a clear image can be taken.

- Slow shutter speed can cause motion blur.

Detection Accuracy Factors

| 1. Vehicle	2. Physical Surroundings	3. Camera
• Speed • Plare size and position	• Lighting conditions • Weather	• Exposure • Field of view • Shutter speed • Resolution • Positioning

Image Quality

A bad image, like motion blur, wil result in lower recognition. Make sure to check your settings to optimize the image quality.

Stroke Width

A stroke width that is too wide may result in unrecognizable license plates or inaccurate results. To ensure accurate recognition, the minimum character height must be 30 pixels and the minimum plate width must be 150 pixels.
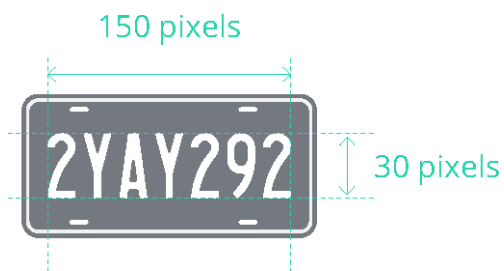
Minimum Frame Rate

A frame rate that is too low may result in unrecognizable license plates or inaccurate results. To ensure accurate recognition, the mimimum frame rate must be at least above 20 FPS.

Vehicle Speed

The speed of the vehicle may affect whether the liense plate can be identified correctly. Depending on the camera specficiations and mounting environments, such as light and exposure, camera can detect the maximum vehicles speed of 40 km/h.

Supported Regions

We support all license plates that cotain numeric or alphanumeric characters. Select the following region to get an accurate reading.

• Taiwan

• Switzerland

• Germany

• France

• United States

Camera Settings

Resolution	1080 p or higher
Capture distance	7 - 20m
Mounting height	3 - 10m
Camera orientation - Tilt	15° - 30°
Camera orientation - Horizontal	25°
Camera orientation - Roll	25°
Minimum frame rate	20 FPS
Maximum acceptable traffic speed for successful recognition	40 km/hr
Maximum number of license plates that can be recognized in one frame	4
Minimum charcter height	30 pixels
Minimum plate width	150 pixels
Minimum number of plate characters	4
Maximum number of plate characters	12
Database number	10,000
Match tolerance	2
Two-line plate detection	No

Configure Software Settings

Once your cameras are mounted successfully, you can configure software settings for the DVA to suit your requirements. This chapter covers the essential settings for the License Plate Recognition.

Select People & Vehicle Detection

To use the License Plate Recognition function, select **People & Vehicle Detection** as your task type.
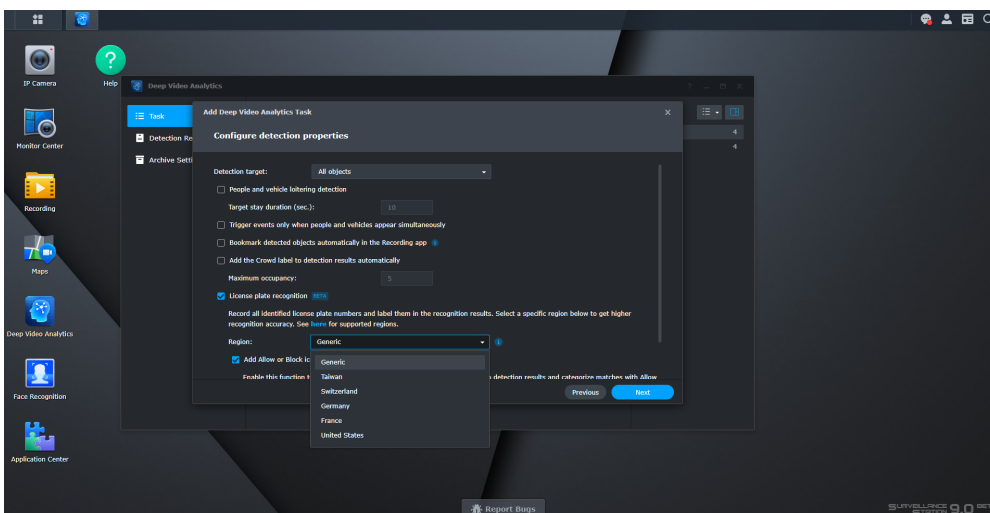
Select a Stream Profile

For optimal detection accuracy, select a resolution of at least 1920x1080@20FPS.

Enable the License Plate Recognition Function

In the **Configure detection properties** page, tick **License plate recogntiion** to enable the relevant function.

Select the specific region to optimize the recognition accuracy.

Add license plates to the license plate database. Tick **Add Allow or Block icons to detection results** to automatically compare license plates in the database with detection results and matches with **Allow** or **Block**.
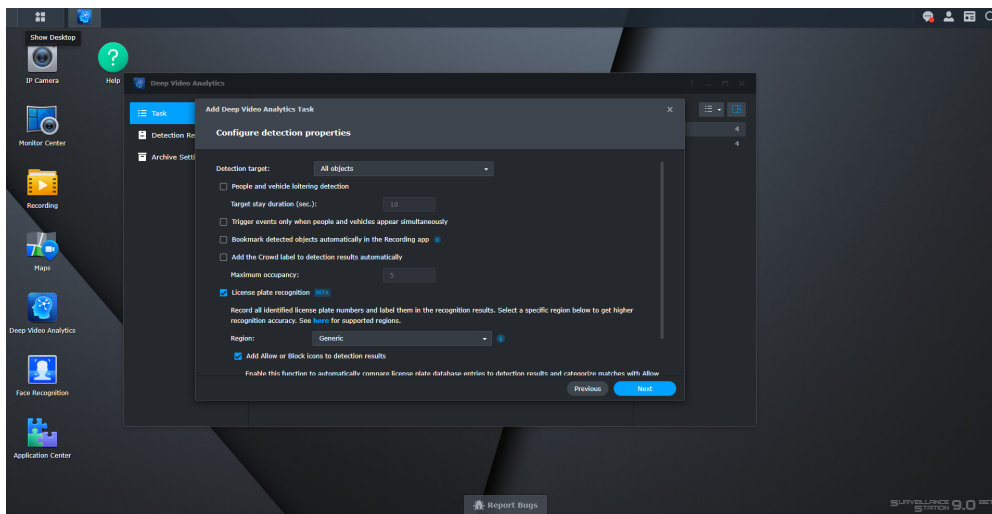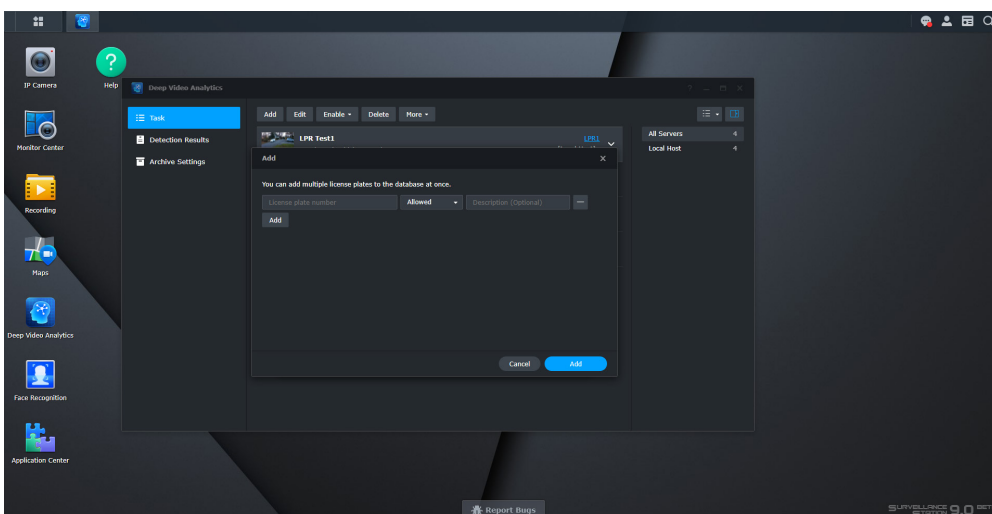
Manage the License Plate Database

You can manage your license plate database from **Task** > **More** > **Manage License Plate Database** or in the sesttings of the People and Vehicle task.

The database can contain up to a total of 10,000 user-profiles and the license plate can include 4 to 12 Unicode characters.
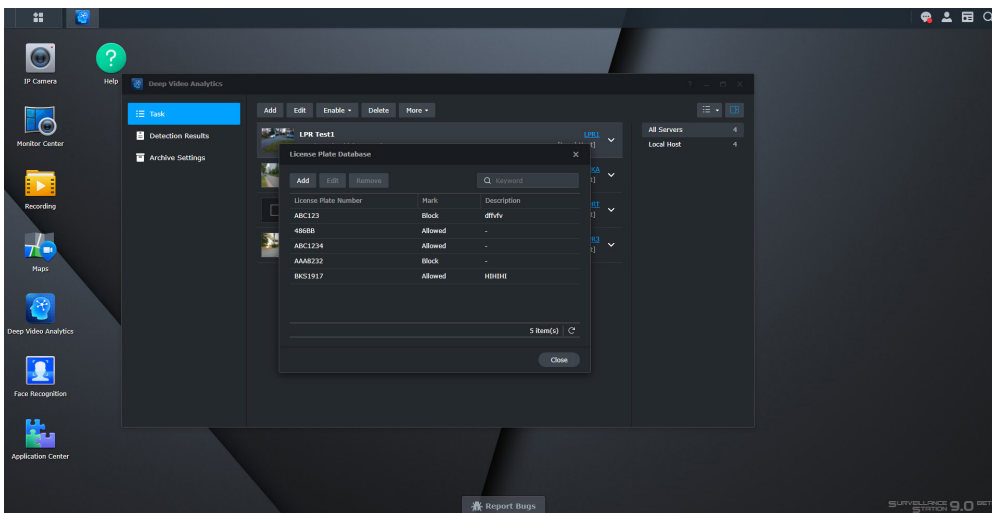
To create a license plate profile, click **Add**. Fill in the license plate numbers, choose **Allowed** or **Block**, and add a description.
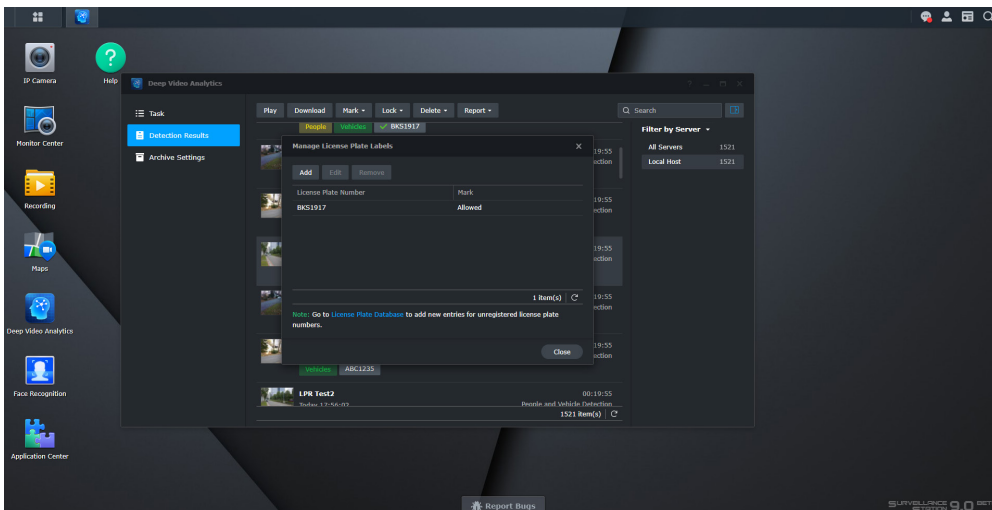
Manage Detection Results

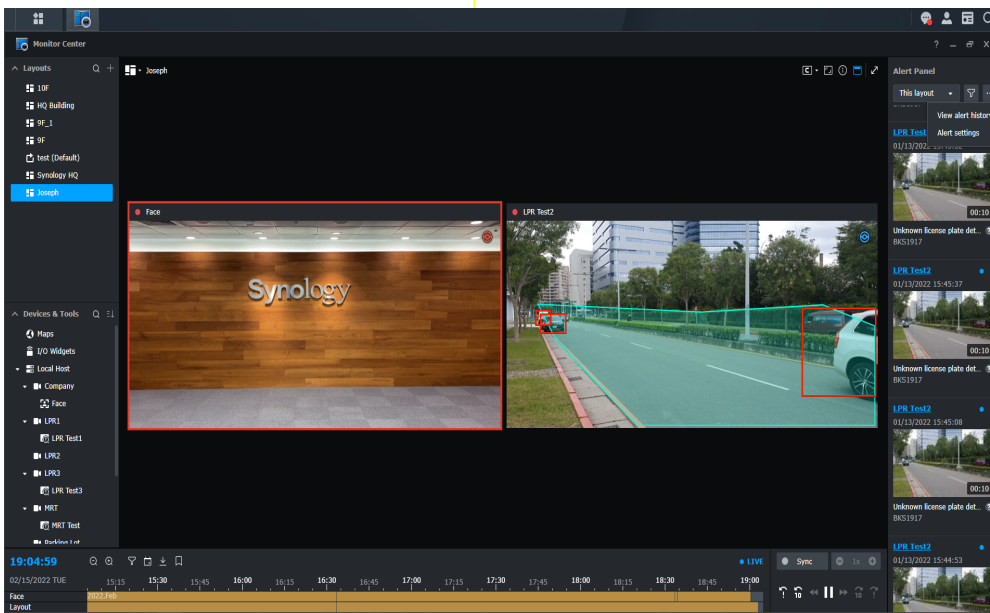Go to **Detection Results** to mange the license plate results.
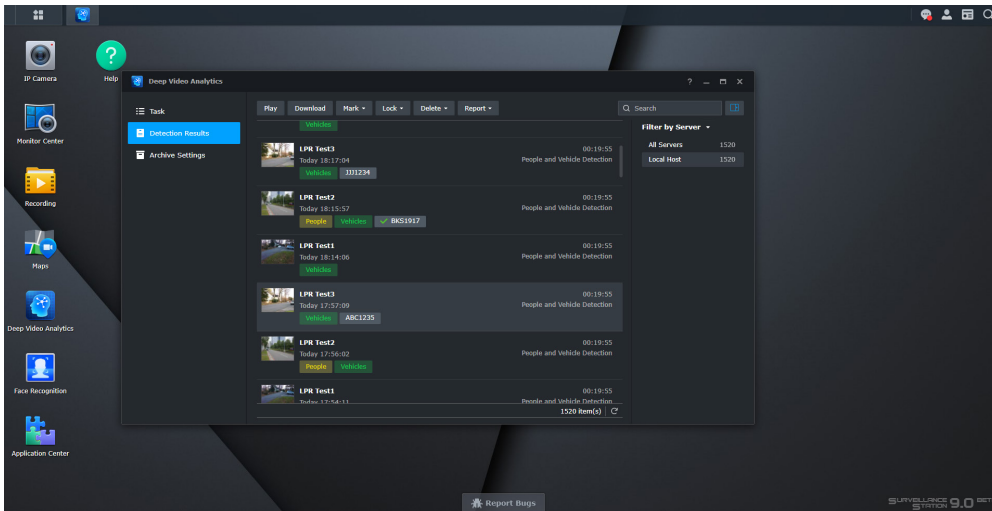
If there is a license plate that was detected incorrectly, right-click on the result or click **Mark** >
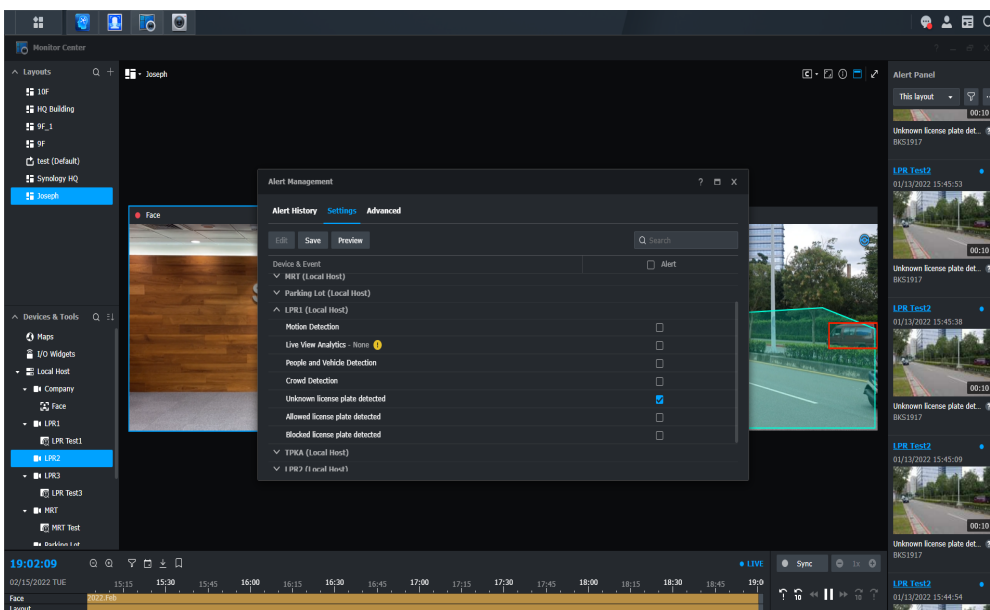**Manage license plate labels** to edit the license plate.

Alert Settings

If you want to receive alarms for Unknown/Allow/Block license plates, go to **Monitor Center** >
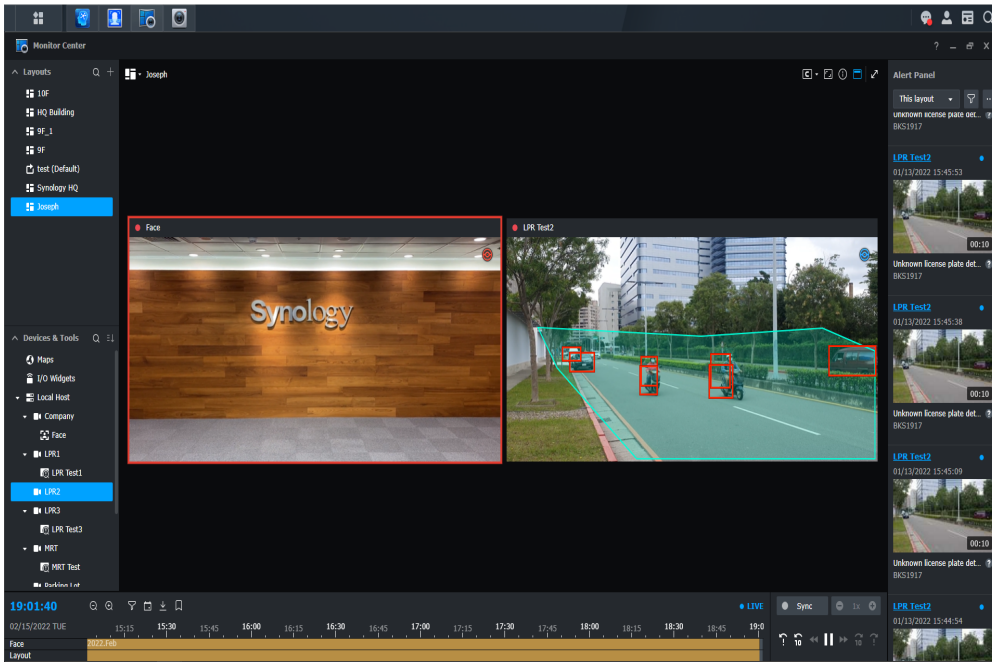**Alert Panel** > **Alert settings**.

Select the device and tick the box to receive alerts for **Unknown**, **Allowed**, or **Blocked** license
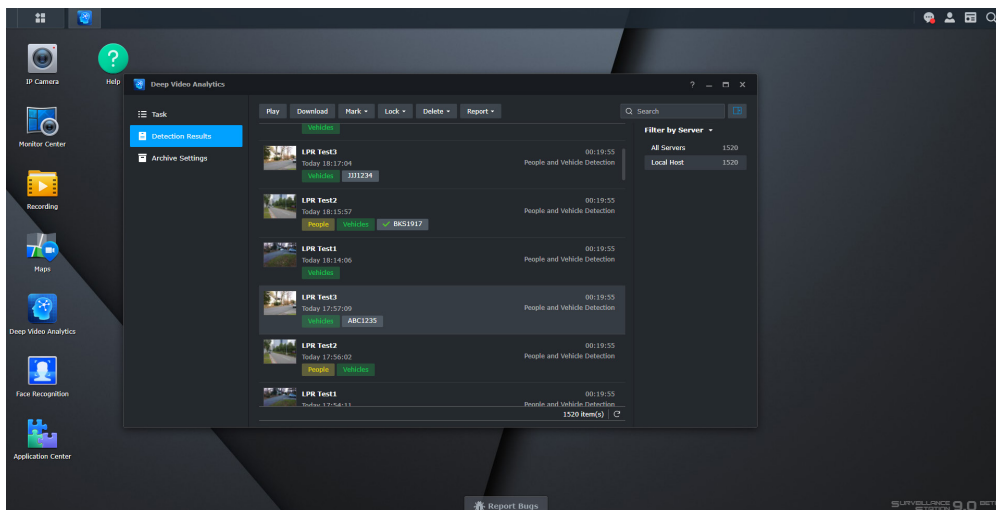plate detected.

You can find the following alert information in the alert panel:

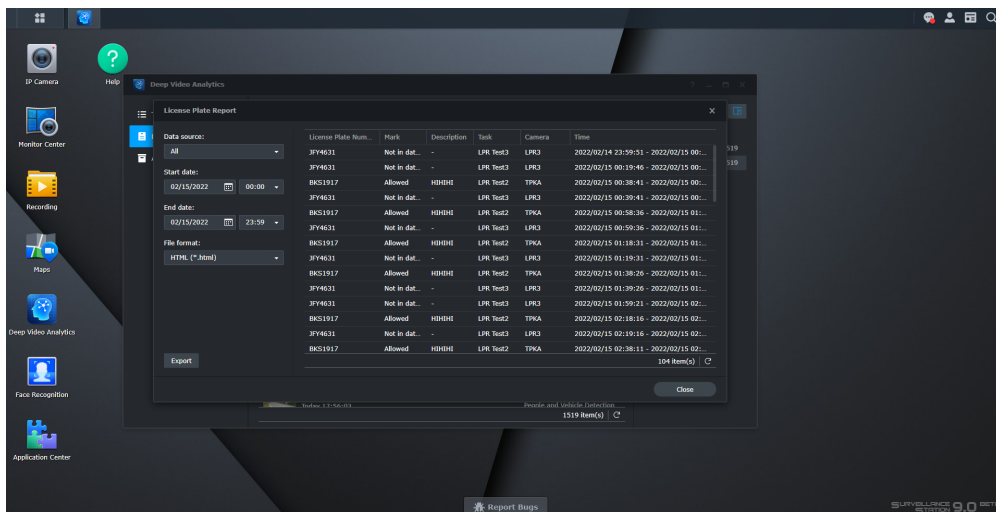- Date and time

- License plate number

- Description

- Status

Export Reports

If you need to manage or analyze the detected vehicles, go to **Detection Results** > **Reports**.

Filter your results and export the license plate report.

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