

# ANPR Camera Installation Manual

UD03906N

## **ANPR Camera Installation Manual**

### **About this Manual**

This Manual is applicable to ANPR Network Camera.

This manual may contain several technical or printing errors, and the content is subject to change without notice. The updates will be added to the new version of this manual. We will readily improve or update the products or procedures described in the manual.

Different models may differ in functions, please refer to the actual GUI of each model.

### **DISCLAIMER STATEMENT**

“Underwriters Laboratories Inc. (“UL”) has not tested the performance or reliability of the security or signaling aspects of this product. UL has only tested for fire, shock or casualty hazards as outlined in UL’s Standard(s) for Safety, UL60950-1. UL Certification does not cover the performance or reliability of the security or signaling aspects of this product. UL MAKES NO REPRESENTATIONS, WARRANTIES OR CERTIFICATIONS WHATSOEVER REGARDING THE PERFORMANCE OR RELIABILITY OF ANY SECURITY OR SIGNALING RELATED FUNCTIONS OF THIS PRODUCT.”

## Safety Instruction

These instructions are intended to ensure that user can use the product correctly to avoid danger or property loss.

The precaution measure is divided into “Warnings” and “Cautions”

**Warnings:** Serious injury or death may occur if any of the warnings are neglected.

**Cautions:** Injury or equipment damage may occur if any of the cautions are neglected.

	
<p><b>Warnings</b> Follow these safeguards to prevent serious injury or death.</p>	<p><b>Cautions</b> Follow these precautions to prevent potential injury or material damage.</p>



### Warnings

- Proper configuration of all passwords and other security settings is the responsibility of the installer and/or end-user.
- In the use of the product, you must be in strict compliance with the electrical safety regulations of the nation and region. Please refer to technical specifications for detailed information.
- Input voltage should meet both the SELV (Safety Extra Low Voltage) and the Limited Power Source with 24 VAC or 12 VDC

according to the IEC60950-1 standard. Please refer to technical specifications for detailed information.

- Do not connect several devices to one power adapter as adapter overload may cause over-heating or a fire hazard.
- Please make sure that the plug is firmly connected to the power socket. When the product is mounted on wall or ceiling, the device shall be firmly fixed.
- If smoke, odor or noise rise from the device, turn off the power at once and unplug the power cable, and then please contact the service center.



### Cautions

- Make sure the power supply voltage is correct before using the camera.
- Do not drop the camera or subject it to physical shock.
- Do not touch sensor modules with fingers. If cleaning is necessary, use clean cloth with a bit of ethanol and wipe it gently. If the camera will not be used for an extended period, please replace the lens cap to protect the sensor from dirt.
- Do not aim the camera at the sun or extra bright places. Blooming or smearing may occur otherwise (which is not a malfunction), and affect the endurance of sensor at the same time.
- The sensor may be burned out by a laser beam, so when any laser equipment is in using, make sure that the surface of sensor will not be exposed to the laser beam.

- To avoid heat accumulation, good ventilation is required for operating environment.
- Keep the camera away from liquid while in use.
- While in delivery, the camera shall be packed in its original packing, or packing of the same texture.
- Regular part replacement: a few parts (e.g. electrolytic capacitor) of the equipment shall be replaced regularly according to their average enduring time. The average time varies because of differences between operating environment and using history, so regular checking is recommended for all the users. Please contact with your dealer for more details.
- Improper use or replacement of the battery may result in hazard of explosion. Replace with the same or equivalent type only. Dispose of used batteries according to the instructions provided by the battery manufacturer.
- If the product does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the camera yourself. (We shall not assume any responsibility for problems caused by unauthorized repair or maintenance.)

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# 1 Introduction

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## 1.1 ANPR Camera Overview

Automatic Number Plate Recognition (ANPR) cameras detect passing vehicles and captures the license plates. To obtain the maximum license plate recognition accuracy, you need to install the ANPR camera in a proper way to get the clear image.

## 1.2 Typical Application Scene

### 1.2.1 Entrance Surveillance

To recognize license plate of the entrance, you are recommended to install the camera on both sides of the barrier gate.

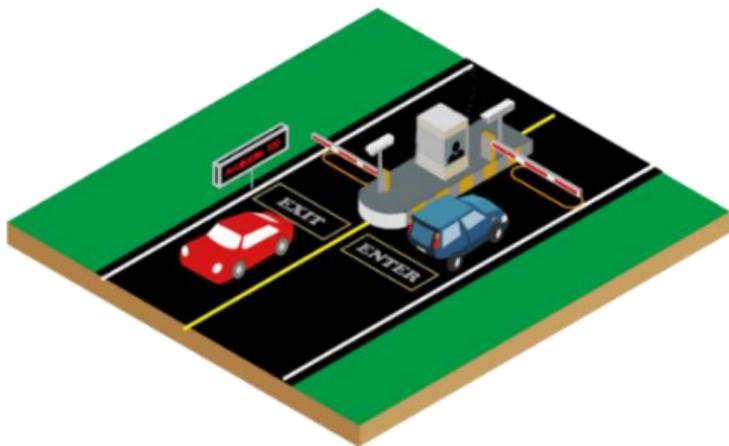


Figure 1-1 Entrance Surveillance Scene

## 1.2.2 Road Traffic Surveillance

To recognize two lanes, you are recommended to install the camera in the middle of a cross pole, and the vehicle speed should be lower than 60km/h.

If the speed is higher than 60km/h, the camera is recommended to recognize only one lane.

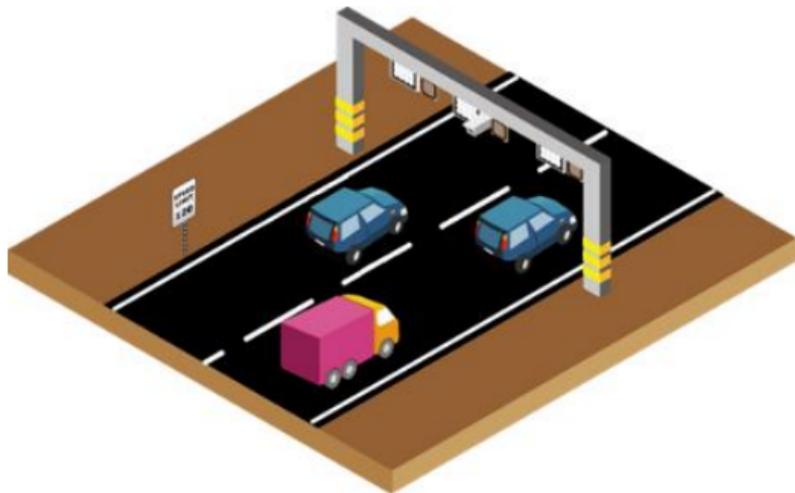


Figure 1-2 Road Traffic Surveillance Scene

## 2 Installation

### 2.1 Before you Start

The camera installation condition should meet the following requirements:

- Make sure no tree or stuff is sheltering the vehicles.
- If you use a camera with a CS-mount lens, use fixed lens. With greater depth of focus, fixed lens performs better for license plate recognition.
- Direct sunlight beams can distort a picture. Use a lens with auto iris mode if the cars faces direct sunlight.
- The license plate tilt angle must be within +/-5 degrees.



Figure 2-1 License Plate Tilt Angle

Figure 2-2

### 2.2 Lens Selection

**Purpose:**

To get enough pixels in the frame, you should select a proper lens.

**Step:**

1. Define the Recognition distance of your scene.

**Note:**

To get the recognition distance, you need to define the camera height (H). The detection range (L) can be calculated with the equation  $L = \cot 30^\circ \times H$ .

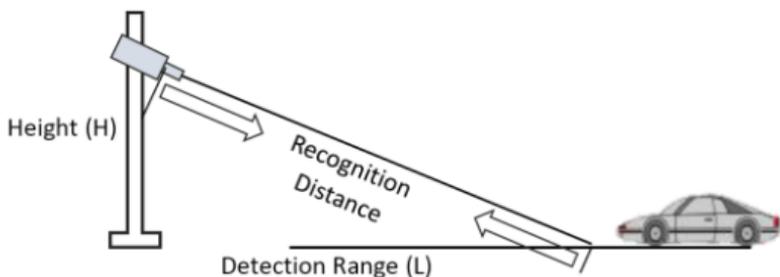


Figure 2-3 Recognition Distance

2. Select a proper lens according to the table below. The recognition distance based on the camera's focal length.

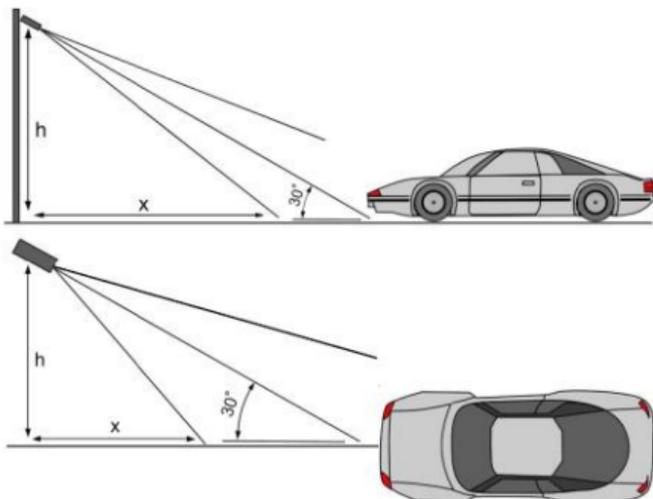
Table 2-1 Lens and Recognition Distance Table

Camera	Lens (mm)	Min. Recognition Distance (m)	Max. Recognition distance (m)	Scene
ANPR Camera	2.8-12	6	18	Entrance
	3.8-16			
	8-32	15	50	Road Traffic
	7-33			
11-40				

## 2.3 Installation Angle

The installation angle must meet the requirements below:

- Vertical angle should not exceed 30 degrees.
- Horizontal angle should not exceed 30 degrees.



## 2.4 Entrance Surveillance Application

Take the figure below for the application of entrance surveillance application.

**Note:**

For entrance surveillance, the camera height (H) should be 1.6 meter to 2 meters.

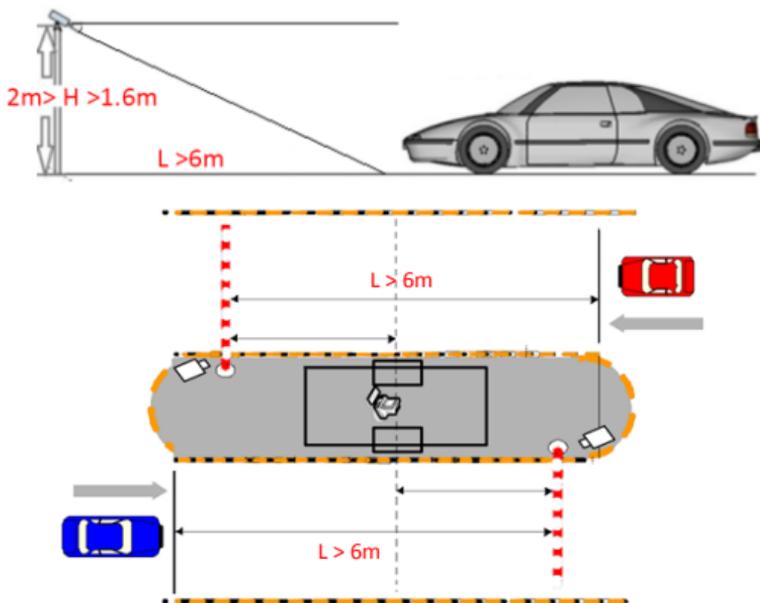


Figure 2-4 Entrance Surveillance Application

## 2.5 Road Traffic Surveillance Application

### Notes:

- For road traffic surveillance, the camera height should be between 5 meters and 6 meters.
- To recognize two or more lanes, you are recommended to mount a camera on a crossbar.
- Make sure the pole for mounting the camera does not vibrate a lot when heavy truck or similar vehicle passes.

Take the figure below for the application of two lane with camera mounted on the side of crossbar.

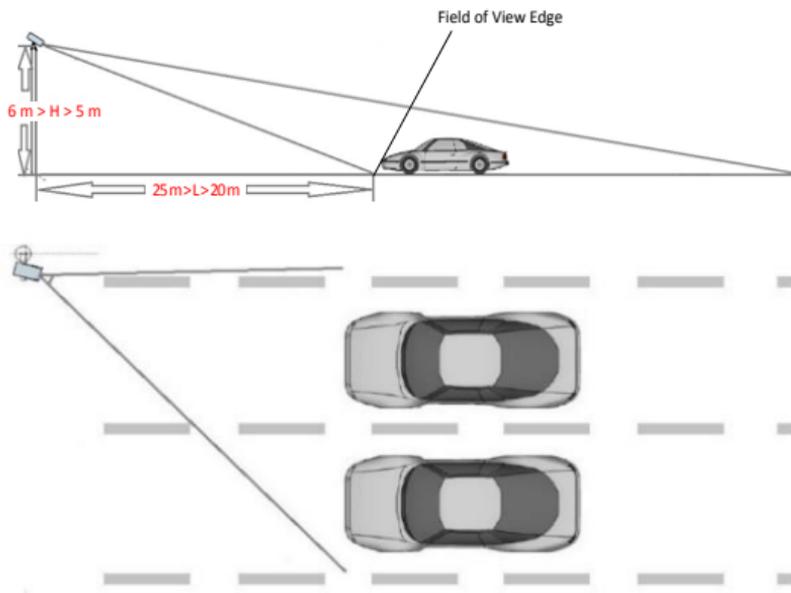


Figure 2-5 Two Lanes (Camera on the Side of Crossbar)

Take the figure below for the application of two lane with camera mounted in the middle of crossbar.

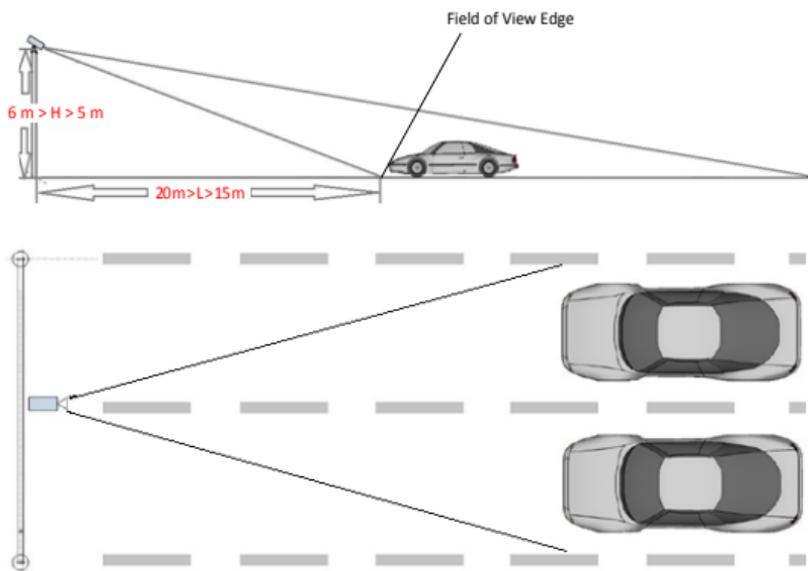


Figure 2-6 Two Lanes (Camera in the Middle of Crossbar)

## 3 License Plate Recognition

### *Before you start:*

When you use the license plate recognition function, please meet the requirements below:

- To reduce the effect of the car's headlights at night, the shutter speed should be no less than 1/1000 s. To NOT obscure the edge of the lines (especially shadows), the shutter speed should not exceed 4/1000 s.
- To avoid overexposure of license plate, the recommended value of Gain setting is 20.
- Turn off the WDR and BLC functions to keep all the details.
- Keep the Digital Noise Reduction value between 10 and 20.
- Sometimes, invalid information may be detected as license plate such as: ads or image parts with numbers and letters. You should follow the steps below:
  - a) Adjust the ROI accordingly to avoid the parts that may be false detected.
  - b) Adjust the min and max license plate pixel settings.
  - c) Sometimes, change the angle of lens or move the camera.
- Set the exposure time according to the table below. We assume the camera is mounted at a horizontal angle of 30 degrees.

Exposure Time (s)	Maximum Vehicle Speed (kmph)
1/100	5
1/500	40
1/1000	100
1/2000	200
1/4000	400

### 3.1 Depth of Field

To effectively capture the vehicle camera should be set so as to provide the minimum depth of field (DOF). Depth-of-field (or length of the zone of sharpness) is the amount of distance between the nearest and farthest objects that appear in acceptably sharp focus in a video.

You are free to calculate the minimum depth of field using the formula.

$$L_{dof} = \frac{4 * T_{rec} * V_{max}}{3600}, m$$

$L_{dof}$  (depth-of-field), length in meters, m;

$T_{rec}$  (recognition time per one plate), in milliseconds, ms;

$V_{max}$  (maximum vehicle speed), kmph.

Using this equation, we've calculated some typical cases for you.

Table 3-1 Depth of Field Calculation

$V_{max}$ (kmph)	$T_{rec}$ (ms)				
	100	200	300	400	500
	$L_{dof}$ (m)				
40	4	9	13	18	22
80	9	18	27	36	44
100	11	22	33	44	56

120	13	27	40	53	67
140	16	31	47	62	78
180	20	40	60	80	100
200	22	44	67	89	111
220	24	49	73	98	122
240	27	53	80	107	133

**Notes:**

- The minimum sizes of the number plate on the edges of the zone of sharpness shall not be less than the width pixel requirements in Section 3.2.
- DOF depends on F-number of lens diaphragm, which may be automatically adjusted by a camera in case of illumination changes. So iris control must be set to "manual", not "auto". Or ensure that DOF length is enough for the worst possible illumination case.
- Change the iris type to manual before focus the lens, and change the iris type back to auto-iris.

## 3.2 License Plate Recognition

**Purpose:**

By using the client software and web browser, you can set the rule of capture pictures and make the ANPR camera identify the numbers. Here we take the road traffic surveillance application as an example.

**Step:**

### 1. Enable **Vehicle Detection**.

- 1). Open web browser.
- 2). Access to the camera via web browser.
- 3). Go to **Configuration-> Advanced Configuration-> System -> VCA Resource** and select **Vehicle Detection**.
- 4). Go to **Advanced Configuration->Road Traffic>Detection Configuration** tab.
- 5). Select Vehicle Detection and check the checkbox.

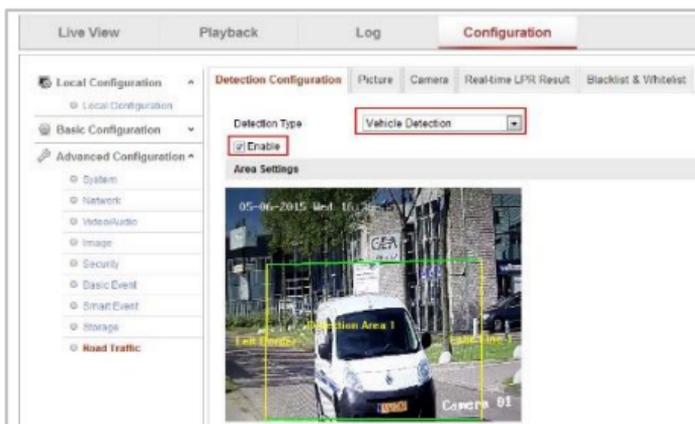


Figure 3-1 Enable Vehicle Detection

### 2. Set the detection area.

- 1). Select the corresponding region.

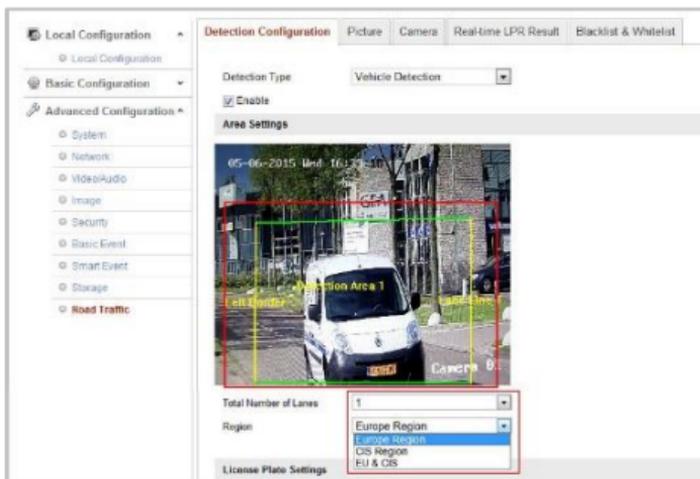


Figure 3-2 Select Region and Lane Number

- 2). Click and drag the lane line to set the range, and drag the line to adjust the length and angle.
- 3). Set the maximum and minimum size of the license plate.



Figure 3-3 License Plate Region Settings

### Notes:

- For detailed information about license plate recognition, refer to the ***User Manual of LPR Network Camera***.

- The operation and configuration for road traffic application varies according to different regions. For EU and CIS region, refer to **Section 3.2.1**; for other regions, refer to **Section 3.2.2**.
3. (Optional) Enable the LED light supplement.
    - 1). Enter **Configuration -> Advanced Configuration -> System -> External Device**.
    - 2). Check the checkbox of Enable Supplement Light.
    - 3). Click Save to save the settings.



Figure 3-4 Enable LED Light

**Note:**

To recognize license plate at night, use a camera with IR LED and enable the LED light supplement.

To connect and trigger the radar, please refer to the appendix.

### 3.2.1 EU and CIS Region License Plate Recognition Settings

#### Steps:

1. Select the lane number from the dropdown list. Up to 4 lanes are selectable.
2. Select the region according to your location. Europe region, CIS region, and Europe & CIS region are selectable.
3. Drag the lane line to set its position, or drag one end of the lane line to adjust the length and position. After you set the lane line and save the settings, a detection area will appear in the live view window.

**Note:** Only one license plate can be captured at one time for each lane.

4. Configure the license plate settings.
  - 1). Set the min. width and max. width of the license plate by input the value manually. The min. width and the max. width range from 130 to 1920.
  - 2). Select the upload mode in the Select Mode dropdown list according to the actual application scene.

The license plate picture will be uploaded if the vehicle exits the detection area within the time interval.

- **Entrance/Exit:** The license plate picture will be uploaded immediately when vehicle detected.
- **City Street:** The license plate picture will be uploaded 5 seconds after vehicle detected.
- **Custom:** You can modify the Time Interval in the text field.

- **Alarm Input:** The license plate picture will be recognized and uploaded when the device receive alarm input.

### Notes:

- When Alarm Input is selected, the alarm input "A<-1" will automatically be assigned to trigger vehicle detection and its alarm type is always NO.
- When Alarm Input is selected and saved, formerly configured linkage method for "A<-1" will be canceled.

Detection Type

Enable

Area Settings



Total Number of Lanes

Region

License Plate Settings

License Plate Width Min. 130 Max. 500

Select Mode:

Figure 3-5 Vehicle Detection Configuration

5. Set the Arming Schedule for Vehicle Detection.

- 1). To edit the arming schedule, click **Edit**.
- 2). Choose the day you want to set the arming schedule.
- 3). Click  to set the time period for the arming schedule.
- 4). (Optional) After you set the arming schedule, you can click **Copy** to copy the schedule to other days.
- 5). Click **OK** to save the settings.

**Note:** The time of each period cannot be overlapped.

6. Check the checkbox to select the linkage method. Notify surveillance center and upload to FTP are selectable.

**Notify Surveillance Center:** Send an exception or alarm signal to remote management software when an event occurs.

**Upload to FTP:** Capture the image when an alarm is triggered and upload the picture to a FTP server. And save the picture on the local memory card or connected NAS.

**Trigger Alarm Output:** Trigger one or more external alarm outputs when an event occurs.

**Note:** To trigger an alarm output when an event occurs, refer to **Section 5.6.4 Configuring Alarm Output** to set the related parameters.

7. Click **Save** to save the settings.

### 3.2.2 Universal Region License Plate Recognition Settings

#### **Steps:**

1. Select the detection type as Vehicle Detection.

2. Check the checkbox of **Enable** the enable road traffic.
3. Select the lane number from the drop-down list. Up to 4 lanes are selectable.
4. Select the region according to your location. Europe region and Russian region are selectable.
5. Click and drag the lane line to set its position, or click and drag one end of the lane line to adjust the length and position. After you set the lane line and save the settings, a detection area will appear in the live view window.

**Note:** Only one license plate can be captured at one time for each lane.

6. Configure the license plate settings.
  - 1). Set the min. width and max. width of the license plate by input the value manually. The min. width and the max. width range from 130 to 1920.
  - 2). Check the checkbox to enable the Real-Time LPR Result. You can see the live view of the passing vehicles, and check the captured license plates. The Real-Time LPR Result page does not display if you leave the checkbox unchecked.
7. Set the Arming Schedule for Vehicle Detection.
  - 1). To edit the arming schedule, click **Edit** button.
  - 2). Choose the day you want to set the arming schedule.
  - 3). Click  to set the time period for the arming schedule.
  - 4). (Optional) After you set the arming schedule, you can click the **Copy** button to copy the schedule to other days.
  - 5). Click **OK** to save the settings.

**Note:** The time of each period cannot be overlapped.

8. Check the checkbox to select the linkage method. Notify surveillance center and upload to FTP are selectable.

**Notify Surveillance Center:** Send an exception or alarm signal to remote management software when an event occurs.

**Upload to FTP:** Capture the image when an alarm is triggered and upload the picture to a FTP server. And save the picture on the local SD card or connected NAS.

9. Click **Save** to save the settings.

Detection Configuration | Picture | Camera | Real-time LPR Result

Detection Type: Vehicle Detection

Enable

Area Settings

05-20-2015 Wed 10:31:27

Lane-Line 2  
Detection Area 2  
Detection Area 1  
Lane-Line 1  
Left Border  
Camera 01

Total Number of Lanes: 1

Region: Europe Region

License Plate Settings

License Plate Width: Min. 1000 Max. 1920  Enable Real-time LPR Result

Figure 3-6 Vehicle Detection Configuration

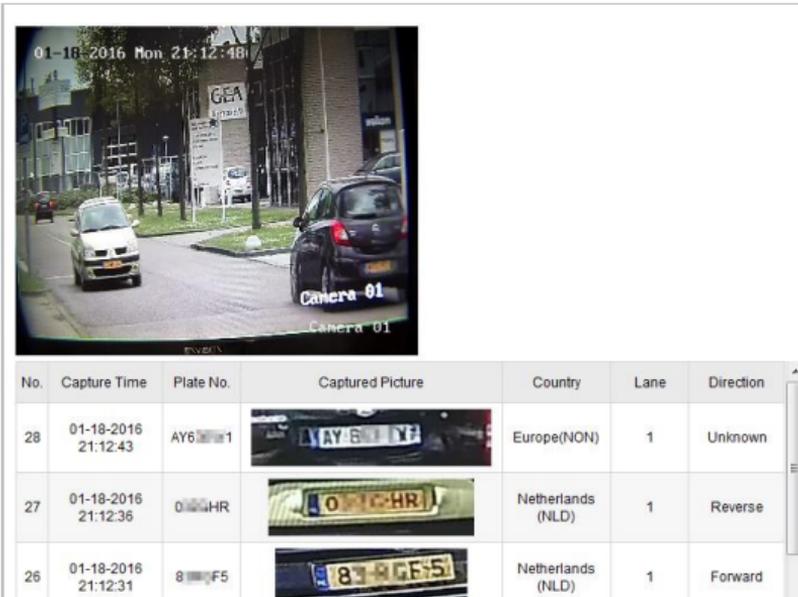
## 3.3 Real-time LPR Result

### 3.3.1 EU and CIS Region Real-time LPR Result

The real-time LPR result page displays the captured license plate in the license plate result area. The information including capture time, plate No., captured picture, country, lane and direction will be listed as well.

Enter the Real-time LPR Result interface:

**Configuration > Advanced Configuration > Road Traffic > Real-time LPR Result**



The screenshot shows a camera feed at the top with a timestamp '01-18-2016 Mon 21:12:18'. Below the feed is a table with the following data:

No.	Capture Time	Plate No.	Captured Picture	Country	Lane	Direction
28	01-18-2016 21:12:43	AY6 1		Europe(NON)	1	Unknown
27	01-18-2016 21:12:36	01 HR		Netherlands (NLD)	1	Reverse
26	01-18-2016 21:12:31	83 GF5		Netherlands (NLD)	1	Forward

Figure 3-7 Real-time LPR Result Interface

### Notes:

- You can export vehicle information in the form of an excel file in playback interface. Refer to *User Manual of Network Camera\_LPR* for details.
- The real-time LPR result page appears only when you check the **Enable Real-time LPR Result** checkbox in Real-time LPR Result page.
- For the item of country, you can uncheck the checkbox to hide it.

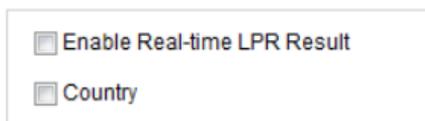


Figure 3-8 Checkbox

### 3.3.2 Universal Regions Real-time LPR Result

The real-time LPR result page displays the captured license plate in the license plate result area. The information including capture time, plate No., license plate number, and country will be listed as well.

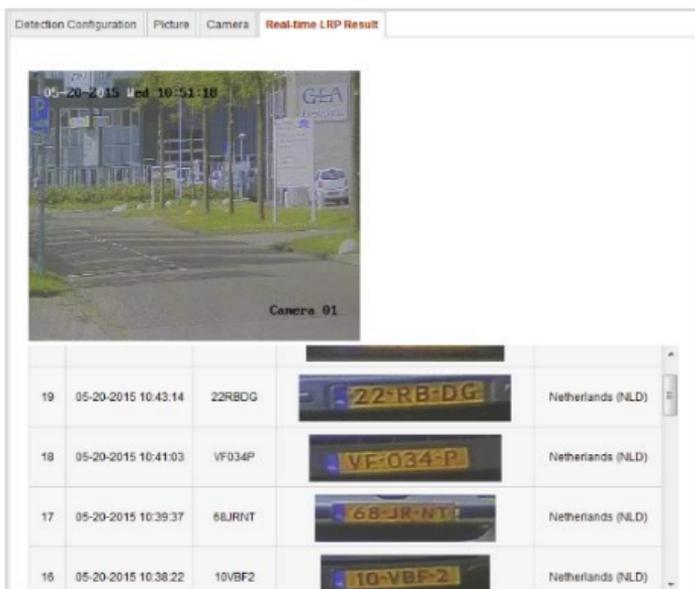


Figure 3-9 Real-time LPR Result Interface

**Notes:**

- The real-time LPR result page appears only when you check the checkbox of Enable Real-time LPR Result in detection configuration page.
- Up to 20 latest pictures can be displayed on the LPR result area.

## 3.4 Pixel Requirement

### Purpose:

The dimensions of the license plate vary according to different areas. To get a valid image of ANPR camera, you need to measure the plate size and define the minimum valid pixel of the live view.

### Steps:

1. Capture a live view picture of passing vehicle.
2. Measure the pixel of the license plate.
- 4). Open Paint.

**Note:** You can use any graphic editors (like photoshop) to measure the pixels of the license plate.

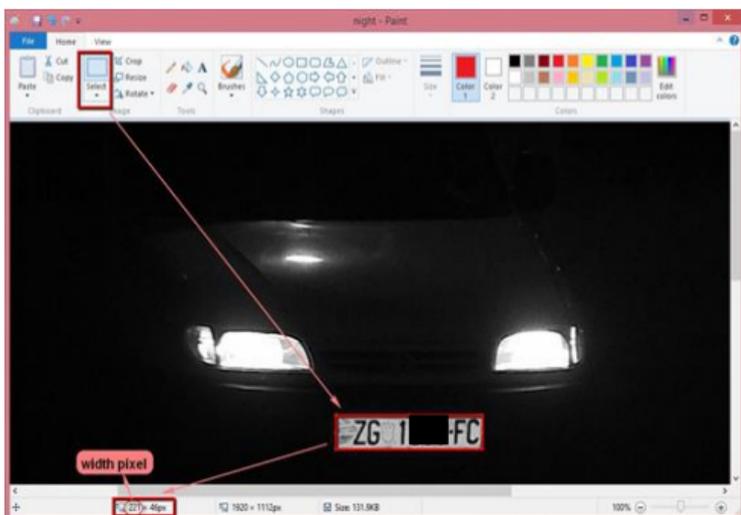


Figure 3-10 License Plate Pixels

- 5). Click  and select the license plate. In the lower left corner of the paint interface, the pixel of the frame displays.

### **Notes:**

- License plate itself must be clear in the video.
- The plate should be between 16 to 50 pixels of height, and for better recognition result, the plate should be between 20 to 40 pixels in height.
- The plate should be between 100 to 200 pixels of width, and for better recognition result, in some regions the plate should be between 100 to 180 pixels in width.

## Appendix

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### Radar Trigger

***Purpose:***

If you need to enable a radar trigger, follow the steps below.

***Before you start:***

Prepare an RS-485 serial wire.

***Steps:***

1. Install the radar in the middle of the lane. For details, refer to the manual of radar.

**Note:** Install the radar about 0.5 m from the camera spot.

2. Install the driver of the serial wire in your PC.
3. Connect the terminal 485+, 485-, and GND of the RS-485 wire to the radar, and connect the USB terminal to the PC.
4. Power on the radar.
5. Run the radar demo.
  - 1). Select **COM** and press the **Enter the Setup** button.

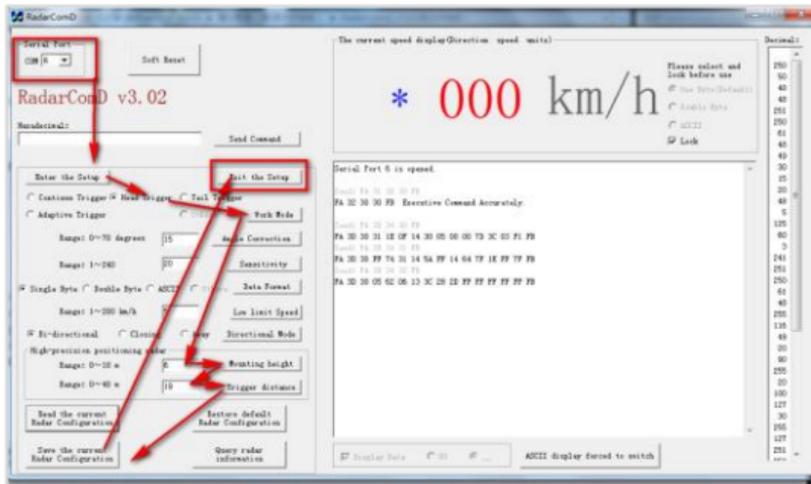


Figure 3-11 Radar Server Configuration

- 2). Check the **Head Trigger** checkbox and click **Work Mode** button.
- 3). Check the **Single Byte** checkbox and click **Data Format** button.
- 4). Enter the mounting height (6) and click **Mounting height** button.
- 5). Enter the trigger distance (19) and click **Trigger distance** button.
- 6). Click **Save the current Radar Configuration** button.
- 7). Click **Exit the Setup**.

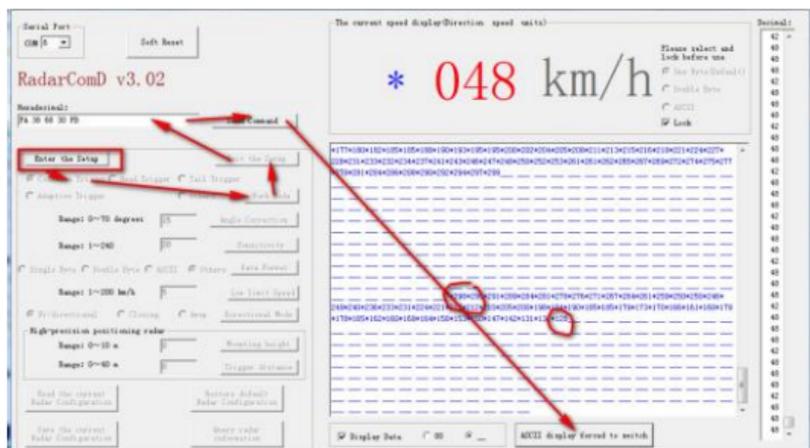


Figure 3-12 Run the Radar

- 8). Click **Enter the Setup** button.
- 9). Check the **Continue Trigger** checkbox and click **Work Mode** button.
- 10). Click **Exit the Setup** button.
- 11). Enter **FA 38 68 30 FB** in the textbox, and click **Send Command**.
- 12). Click **ASCII display forced to switch** button.

**Note:** Calculate the trigger point by the equation  $(29.8+12.8)/2$ .

- 13). Repeat the steps (8) to (10).
6. Link the radar to the camera.

**Note:** The radar linkage interface varies according to different models, the steps below are only for reference.

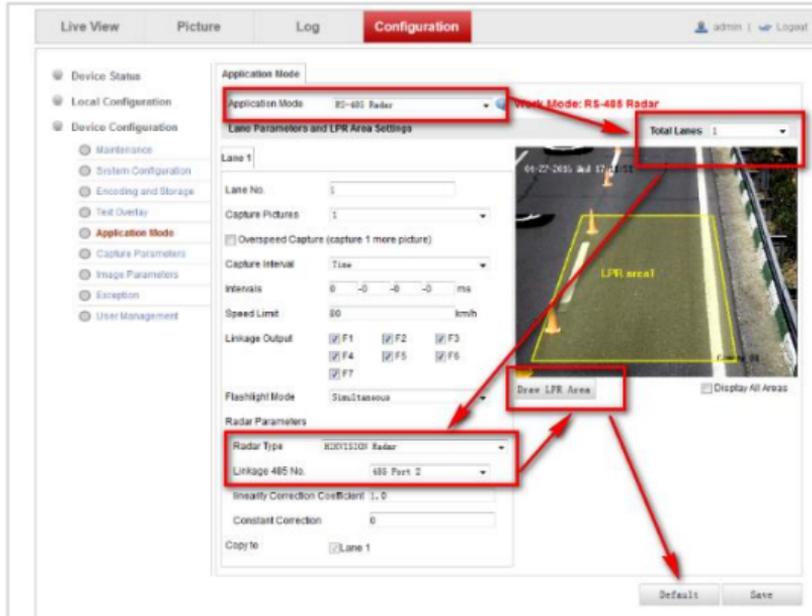


Figure 3-13 Radar Linkage

- 1). In the interface of the ANPR camera, go to **Configuration -> Application Mode**.
  - 2). Select the application mode as **RS-485 Radar**.
  - 3). Select the total lanes, radar type and the linkage RS-485 No.
  - 4). Click **Draw LPR Area** to draw the area.
  - 5). Click **Save** button.
7. Edit the serial port No.
    - 1). Go to **Configuration -> Device Configuration -> System Configuration -> Serial Ports**.
    - 2). Edit the Baudrate of RS-485 parameters to 9600.

8. (Optional) Set the text overlay.
  - 1). Go to **Configuration** -> **Device Configuration** -> **Text Overlay** -> **Single Picture Overlay**.
  - 2). Check the checkbox of where you want to see the overlay on the picture.
  - 3). Select the overlay information from the list
  - 4). Click **Save**.
  - 5). In the **Composed Picture Overlay** interface and **Video** interface, repeat the steps (2) to (4).



Figure 1. World map showing the distribution of various species across different continents and regions. The map is color-coded to indicate the presence of different species groups, with a legend on the right side.

The map shows a high density of species in North America, Europe, and Asia, with a significant concentration in the eastern United States and western Europe. South America, Africa, and Australia show lower densities, with many species having very restricted or very local distributions. The map also shows the distribution of species in the Arctic and Antarctic regions, with a high density in the Arctic and a very low density in the Antarctic.

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