Installation and Configuration Guidance for PTZ ANPR Camera

(一) ANPR mechanism

1. Firmware version

At present, the baseline version of the ANPR function of the PTZ dome camera supports license plate detection in 100 countries. The H7 platform supports ANPR function after V5.5.26, and the H5 platform supports ANPR function after V5.5.27.

2. Detection snapshots

The ANPR dome camera uses deep learning algorithms to detect, recognize and capture the vehicles and license plates in the area. The pixel height of the license plate should be greater than 16 pixels and less than 30 pixels for detection.

The overseas version only supports Vehicle Detection, does not support Mixed-traffic Detection. In the vehicle detection mode, it only supports the City Street mode currently, which generally installed at the road bayonet.
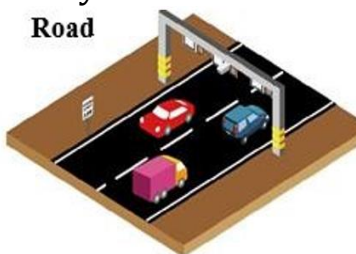

Figure 1 Checkpoint scene

The maximum of 4 lanes can be detected and captured on the City Street mode. The actual number of lanes supported depends on whether the actual scene meets the requirements of the license plate pixel (16 ~ 30 pixels).
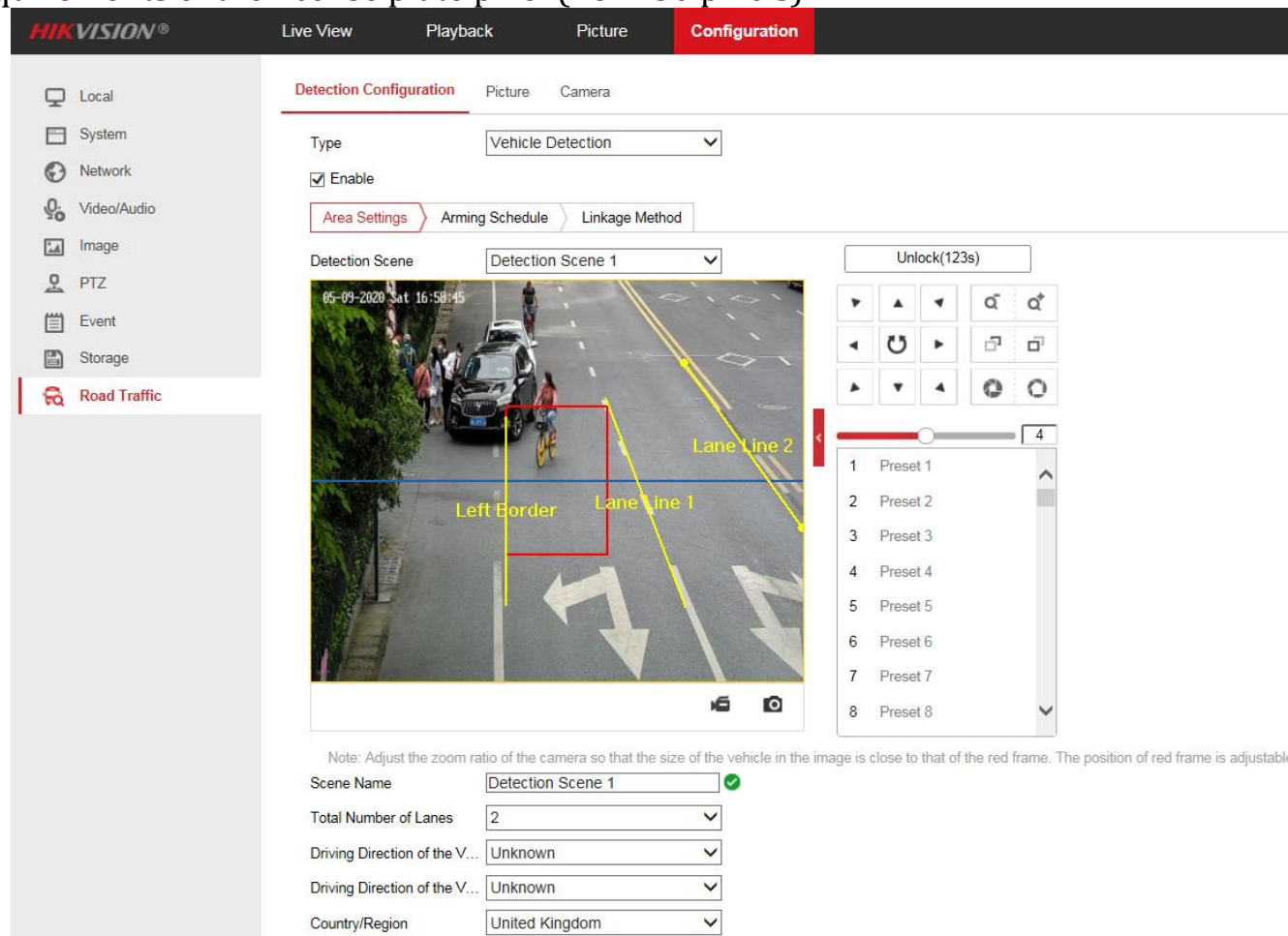

Figure 2 Road Traffic Configuration interface

3. Vehicle detection and recognition mode（Detection Mode）

Platform and version support capabilities: H7 platform devices start to support from V5.5.40 version, H5 platform devices support after V5.5.40 version.

Vehicle detection supports Vehicle Priority and License plate & Vehicle mode. License Plate & Vehicle mode is by default in overseas products.

1) Vehicle Priority Mode

Principle: Identify the vehicle first and then the license plate.

This mode can avoid the problem that barrier can be released in the entrance and exit scenes when people holding the license plate.

2) License Plate & Vehicle Mode

Principle: In the case of very low light, the vehicle may not be recognized. This mode can recognize the license plate and take a snapshot directly according to the result of the recognized license plate. If the vehicle can be detected, it is consistent with the original logic, and the snapshot is taken according to the vehicle detection result.

This mode is mainly used to solve the problem of low capture rate caused by poor vehicle detection rate in night mode.

4. Vehicle feature detection

Platform and version support capabilities: H7 platform devices start to support from V5.5.40 version, H5 platform devices support after V5.5.40 version.

Support motor vehicle attribute recognition (main brand, color, model, etc.), only support forward vehicle recognition, not support back vehicle recognition. The maximum can support:

1) up to 65 major vehicle brands: Hydudai, Toyota, Kia, Honda, Volkswagen, Mercedes-Benz, Nissan, Ford, Isuzu, BMW, Chevrolet, Mitsubishi, Renault, Opel, Suzuki, Skoda, Daewoo, Audi, Mazda, GAC Hino, Peugeot, Ssangyong, Citroen, Fiat, Si Kania, Man Group, Volvo, Lexus, Seat, Land Rover, Daihatsu, Dongwo, Subaru, Iveco, MINI, Jeep/Jeep, Porsche, Chery, Dodge, Chrysler, Acura, Alfa Romeo, Great Wall, Infiniti, Smart, SAIC Chase, JAC, Jaguar, GMC, Lincoln, JMC, Saab, FAW, Yutong, Guangzhou Yunbao, Jiulong, Geely, Cadillac, Jinbei, Ankai, Haima, Futian, Jinlong, Dongfeng and Dorsett.

2) up to 11 body colors: Red, Yellow (including Orange, Gold), Green, Cyan, Blue, Purple, Pink, Brown, White, Gray (including Silver) and Black.

3) up to 7 vehicle types: Bus, Large trucks, Cars, Vans, Minivans, SUV/MPV, Pickup trucks.

This function is the same as the Triggered by video function on the IPC side, except the positions of configuration options and page are different.

5. License Plate Day/Night Mode

Platform and version support capabilities: H7 platform devices start to support from V5.5.40 version, H5 platform devices support after V5.5.40 version.

It is mainly used to solve the problem that the license plate capture function requires earlier switching to the night to turn on the supplement, or needs to turn off the supplement later to avoid the problem that the license plate cannot be captured in the evening and early morning.

This mode is enabled by default in Configuration-> Road Traffic-> Advanced Configuration, and it only takes effect when the image Day and Night mode (Configuration-> Image-> Day / Night Switch) is switched to Auto mode. After taking effect, the device switches the image day and night mode according to the brightness of the license plate in the scene.

Note：

- Only infrared devices support this function, darkfighter X devices do not support(but darkfighter X devices support License Plate & Vehicle mode).

6. Alarm upload

1) Alarm picture

The license plate snapshot will generate two pictures: a large background picture and a small license plate picture. The quality of the large background picture can be setup on the camera web page, as shown in Figure 3 below. The license plate thumbnail is cropped by the license plate coordinates, the default quality is the highest.
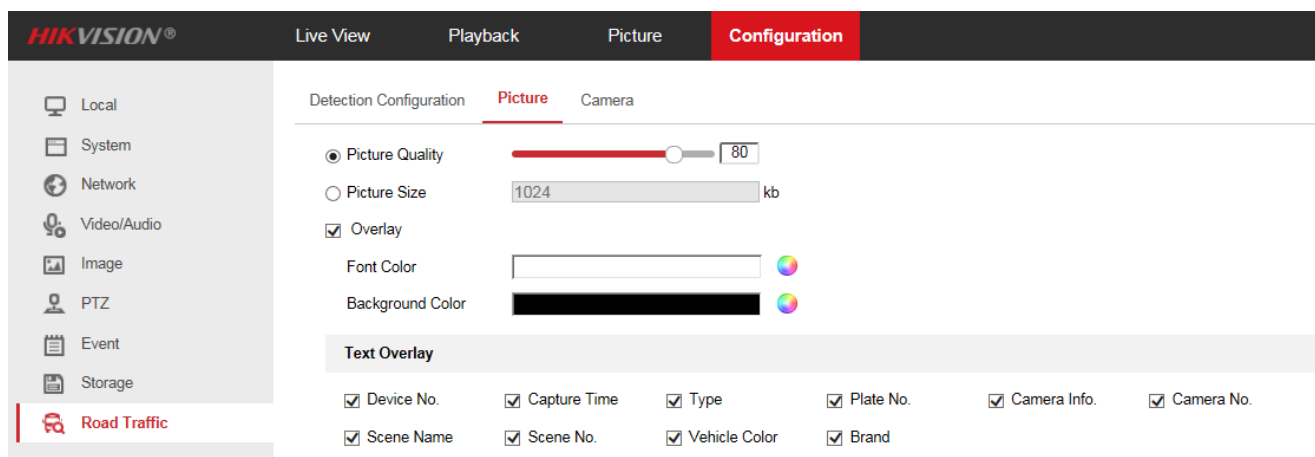

Figure 3 Picture parameter configuration interface

2) Remove Duplicated License Plates

Platform and version support capabilities: H7 platform devices start to support from V5.5.40 version, H5 platform devices support after V5.5.40 version.

After the license plate is recognized and the alarm is uploaded, the same license plate will be filtered after being recognized within 4 minutes (1-5 minutes can be configured, the default value is 4 minutes), and will not be reported. Therefore, when using the same car to test, you need to pay attention to the passing time interval during the test.

This function is mainly to solve the problem that some vehicle bodies are attached with multiple license plates and are continuously captured multiple times when passing through the entrance and exit.

Note：

- After the device restarts or enable, stop the function, it will recount.
- The same license plate filtering algorithm currently supports recording up to 8 license plates. If more than 8 license plates are recognized within the configured time period, only the latest 8 license plates will be recorded. At this time, if a new vehicle passes by, the new license plate will cover the oldest license plate number.

7. Comparison with 7 Series camera

Functions comparison with 7 Series camera:
1) PTZ ANPR camera does not support the Mixed-traffic detection mode.
2) In vehicle detection mode, PTZ ANPR camera only supports city street mode whilst the 7 Series camera supports 3 modes including Entrance/Exit, Alarm input and City Street.
3) PTZ ANPR camera **does not support blocklist and allowlist**.

(二)　Installation and commissioning

1. Erection requirements
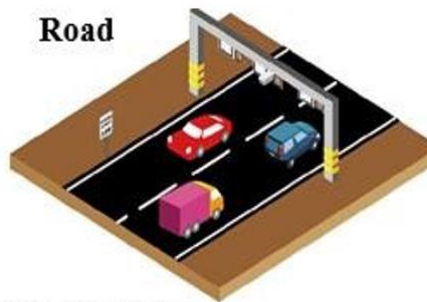
1) Front Mounting
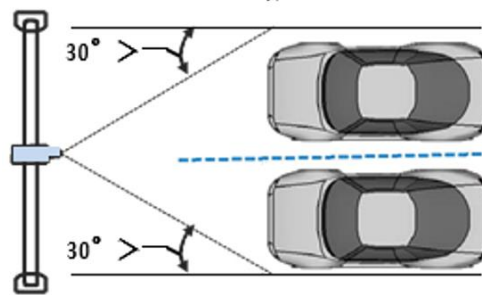
Figure 4 Checkpoint scene

Figure 5 Equipment installation angle
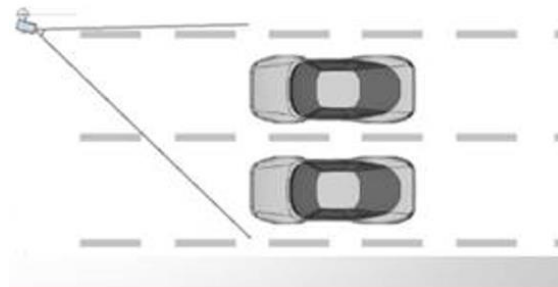
2) Side Mounting

Figure 6 Side Mounting

Overseas products only support vehicle detection, and are effective in accordance with the urban road mode. It can monitor single lane or multiple lanes up to 4. Generally, the 2MP device support 2 lanes capture, the 4MP device supports 3 lanes capture and the 8MP device supports 4 lanes capture.

See the below for monitoring height and minimum trigger distance.

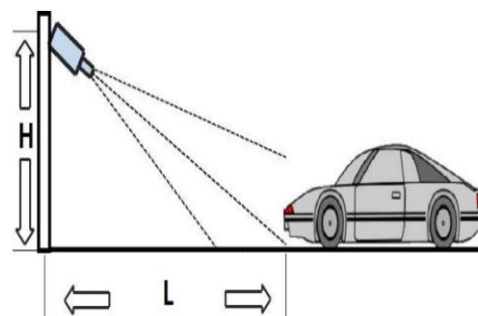| Height(m)	Min L (m)
6	15-50

Figure 7 Installation height

It is recommended to install the dome camera with a height of 6 meters, and the best monitoring distance is about 20-30 meters, and the horizontal angle is less than 30 degrees. If the capture distance is too close, it will make the plate tilt angle too large. If the capture distance is too far, the back car will be hidden by the front car, both of them will impact on the effectiveness of capture.

Note：

- Better for more colorful and content scene.
- Remove the obstruction near the monitoring field of version. And the strong light source can affect the effect at night.
- Setup the device on the middle of monitored lane. Keep the lens away from sky in case to influence the surface brightness.

2. Installation angle test plan

Step 1: Look for a target object to make sure that the center of the dome camera's image is parallel to the direction of road extension. Check the P value on the OSD of the device and record it as P1;

Step 2: Adjust the image of the dome camera to the scene to be monitored, check the P value on the device OSD, and record it as P2;

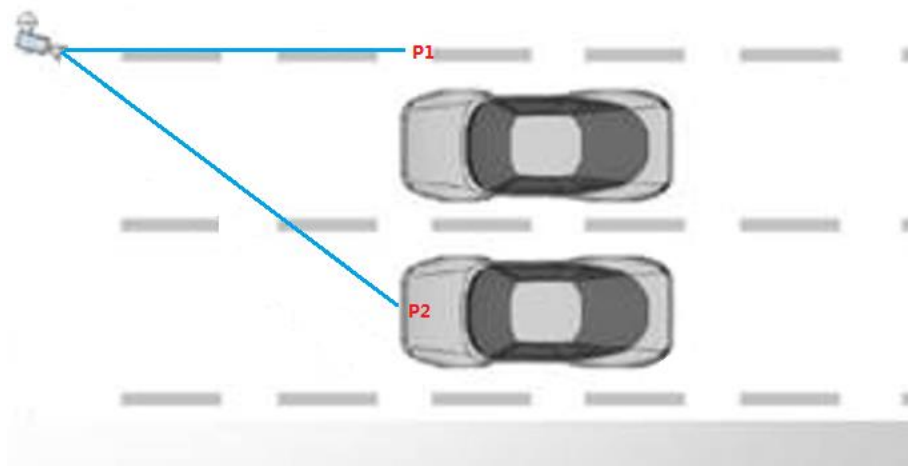Step 3: Calculate the vehicle angle: | P1 – P2 |, the value needs to be less than 30 °.

Figure 8 Installation angle test

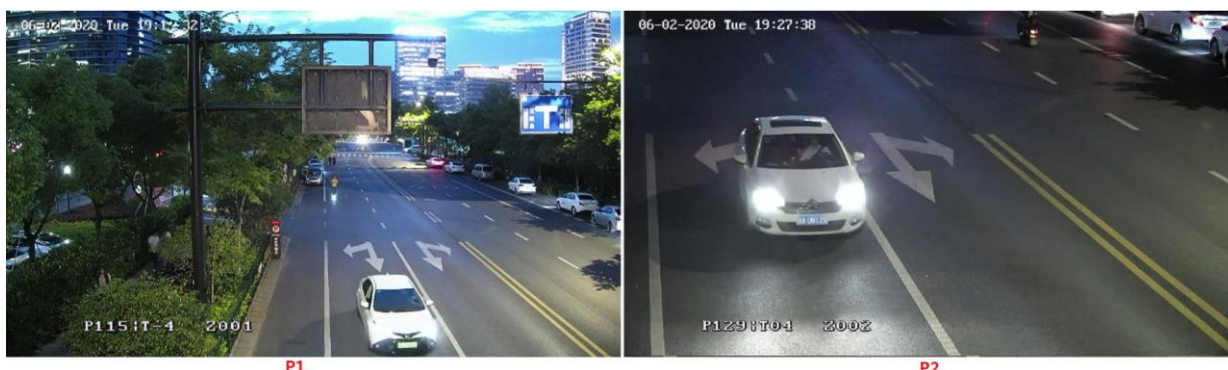Take the dome camera installed on the road as an example (the target object is the front bar):

Figure 9 Angle Test Example

P2-P1=14°<30°, meet the installation angle requirements.

3. Vehicle size

Control the pan, tilt and zoom to adjust the image so that the actual size of the vehicle in the screen is as close as possible to the size of the red frame, which can roughly determine whether the vehicle can be recognized. We don't distinguish big or small vehicles since our algorithm has fully included all size of the vehicles.

But this is just an estimate, you cannot use it as a standard to judge that the configuration has met the requirements which means that you need to refer to number of the pixels (16-30).
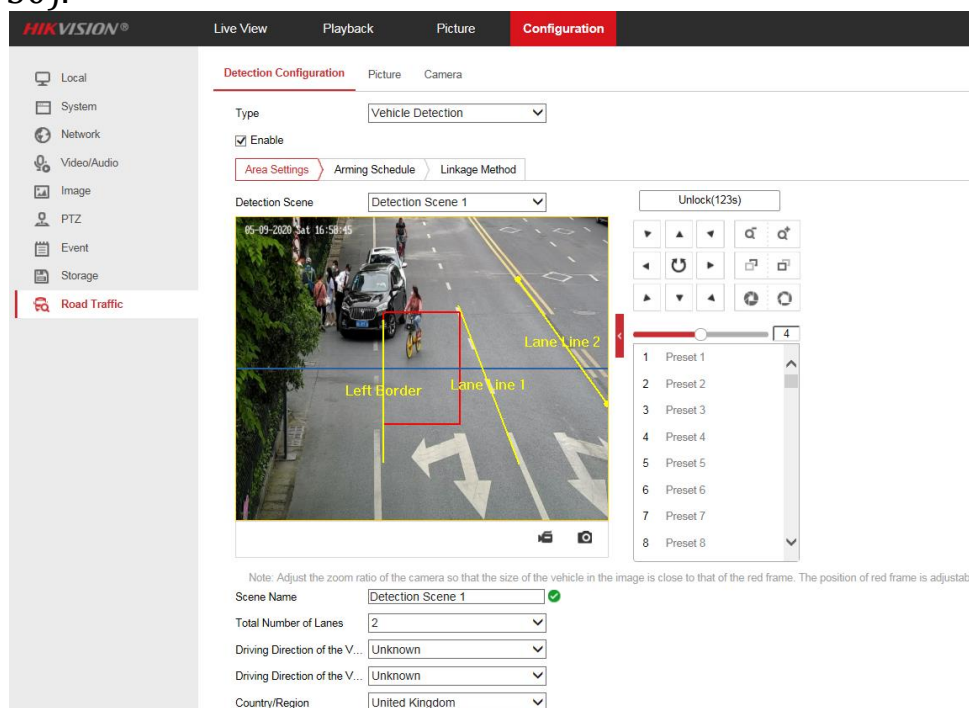

Figure 10 Vehicle red frame

4. Vehicle plate tilt angle check

Adjust the tilt angle between camera and vehicle track to make the plate be horizontal. The tilt angle should be less than 30°.

In addition, target vehicle should go straight in detection area and avoid left-turn or right-turn.

Figure 11 License Plate Tilt Angle

5. License plate pixels

The pixels of the license plate height and width must meet the following requirements in order to ensure a high capture rate.

	Character height range	Best character height	License plate width	Best license plate width
Vehicle priority mode	16~30 pixels	25 pixels	100~150 pixels	120 pixels
	Devices below 4MP take effect at 2MP resolution 4MP and above devices take effect at 4MP resolution			
License plate and vehicle priority mode	16~30 pixels	25 pixels	100~150 pixels	120 pixels
	All devices are effective at 2MP resolution			

Pixel size measurement method：

1) In the IE preview interface, click the first button "Pixel Counter" in the lower right corner of the screen then frame the license plate on the screen, and the pixel value of the license plate width and height will be given.
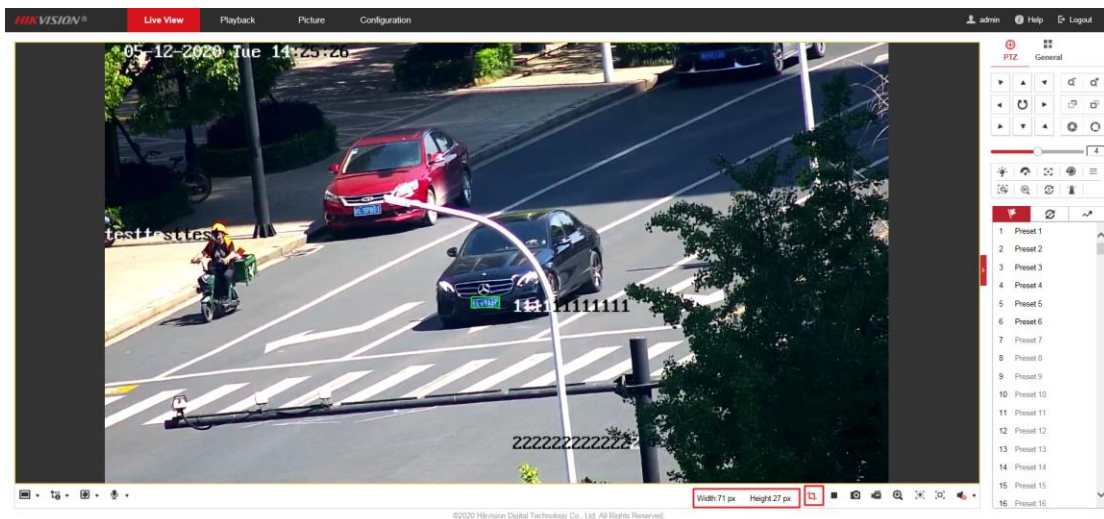
Figure 12 Pixel Counter

2) Under the corresponding resolution, manually capture the background image, and measure the height and width of the license plate with tools such as drawing.
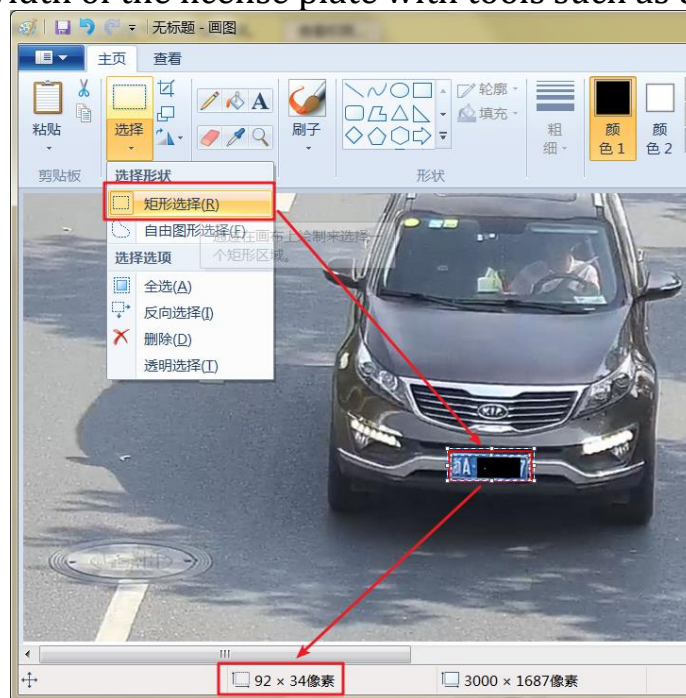

Figure 13 Pixel Counter

Note：

■ In the license plate and vehicle priority mode, the license plate recognition works with 2MP pixels. In the vehicle priority mode, devices below 4MP use 2MP pixels for license plate recognition, and devices above 4MP use 4MP

resolution for license plate recognition. Take license plate height as an example：

	2MP	**4MP**	**8MP**
Vehicle priority mode	License plate height reaches 16 ~ 30 pixels at 2MP resolution, other resolutions are scaled proportionally	License plate height reaches 16 ~ 30 pixels at 4MP resolution, other resolutions are scaled proportionally	
License plate and vehicle priority mode	License plate height reaches 16 ~ 30 pixels at 2MP resolution, other resolutions are scaled proportionally		

■ License plate priority mode needs to be used with License Plate Day / Night mode.

6. Rule line configuration in different scenarios

1) Straight lanes on city street

As shown in Figure 14, about the case where there is only one lane, in order to ensure that all vehicles in the lane are within the recognition area as much as possible, the lane line is drawn outside the actual lane or expanded a little. The snap line should be located at a quarter of the bottom of the entire screen and parallel to the bottom.
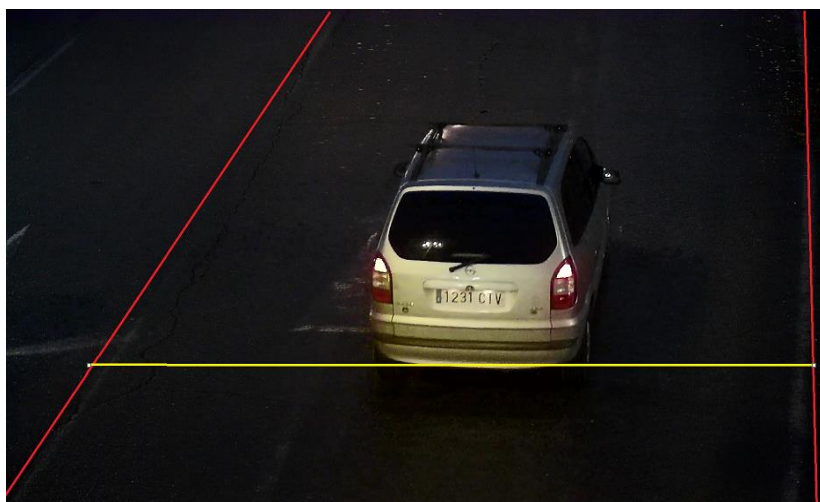

Figure 14 Single lane straight scene

2) Inclined single lane on city street

For only one lane and the passing direction is one-way, the lane is inclined and there is only one lane (no influence from vehicles in other lanes). The lane line can be drawn outside the lane.

As shown in Figure 15, the second lane line is not drawn along the actual lane line, but is drawn at a position extending outward from the actual lane line. Since the vehicle is often driven on the edge of the second actual lane, the second lane line needs to be expanded. In order to ensure that the entire lane is covered, it is necessary to cover most vehicles in the middle.
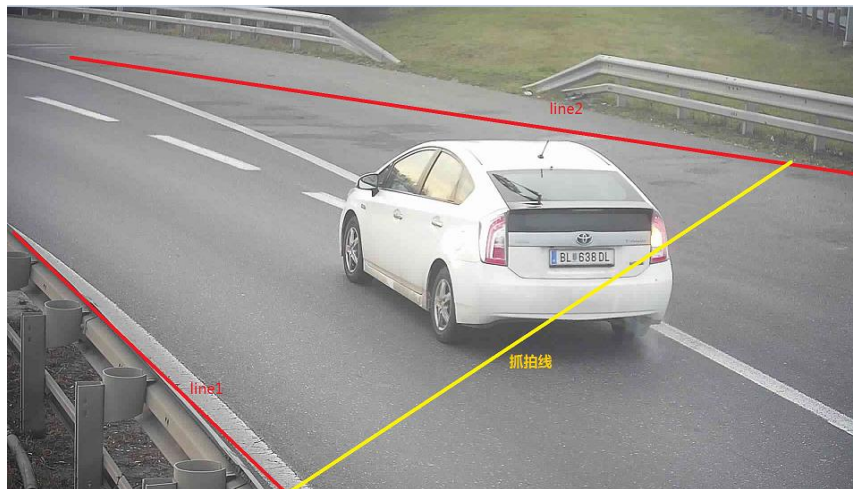
Figure 15 Single lane tilt scene

3) Straight lanes on city street

a) Only identify one lane

As shown in Figure 16, if you want to recognize and only recognize the vehicle on the right lane, you need to draw the lane line inside the two actual lane lines (see line1 and line2). , And parallel to the bottom. Similarly, Figure 17 is a schematic diagram of only identifying vehicles in the left lane.

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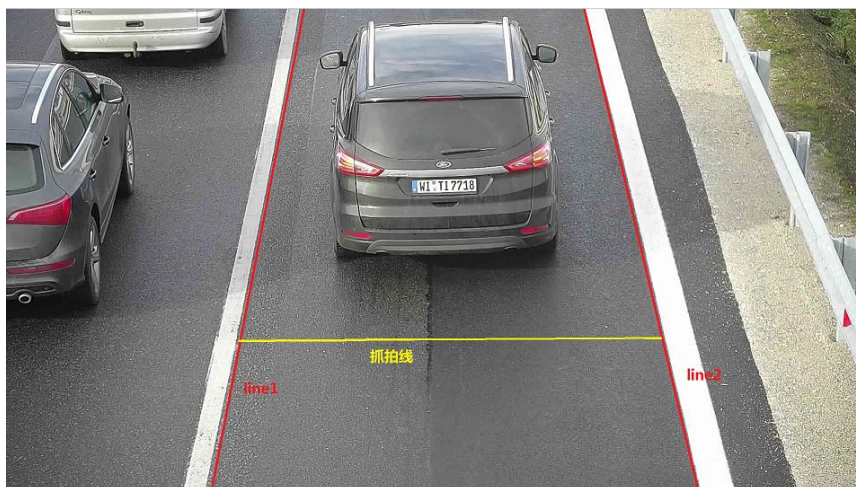| **Title:**	Installation and Configuration Guidance for PTZ ANPR Camera	**Version:**	v1.0	**Date:**	06/08/2020
Product:	PTZ ANPR Camera			**Page:**	13 of 14

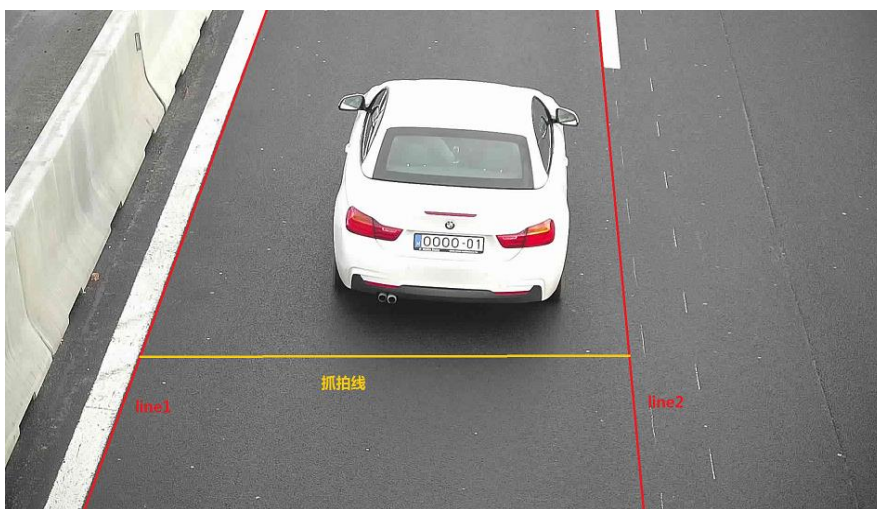Figure 16 Schematic diagram of a two-lane straight-through scene

Figure 17 Schematic diagram of a two-lane straight-through scene

b) Dual-line recognition

As shown in Figure 18, in order to identify vehicles in two lanes, draw the lane line closely to the actual lane lines (see line1, line2, and line3). The capture line should be located at the bottom quarter of the entire screen and parallel to bottom.
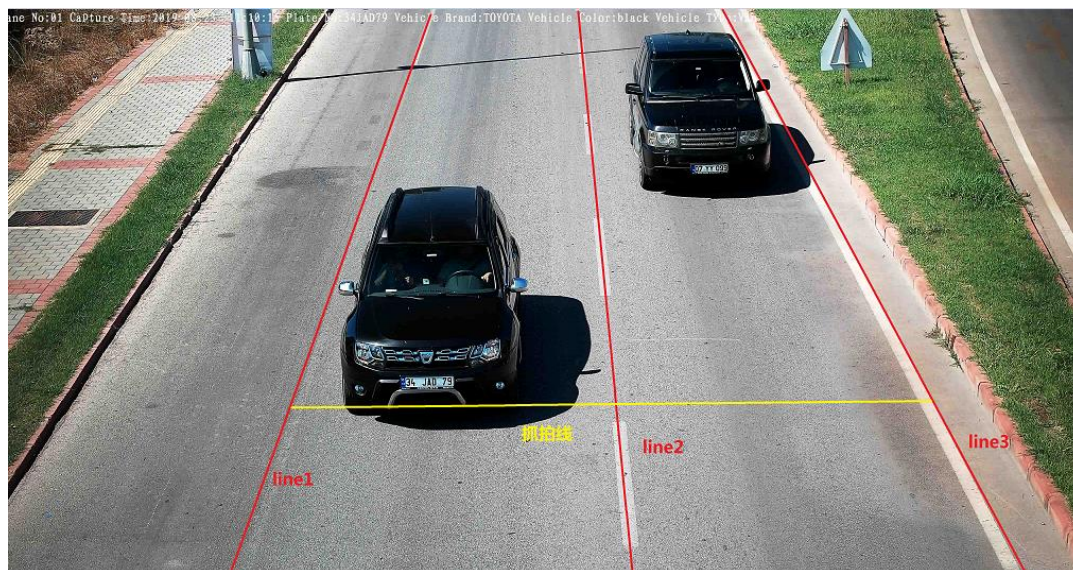
Figure 18 Schematic diagram of the two-lane straight-going scene

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