# Milestone Systems

XProtect® LPR 2025 R1

Administrator manual

milestone

# Contents

# Copyright, trademarks, and disclaimer

Copyright © 2025 Milestone Systems A/S

**Trademarks**

XProtect is a registered trademark of Milestone Systems A/S.

Microsoft and Windows are registered trademarks of Microsoft Corporation. App Store is a service mark of Apple Inc. Android is a trademark of Google Inc.

All other trademarks mentioned in this document are trademarks of their respective owners.

**Disclaimer**

This text is intended for general information purposes only, and due care has been taken in its preparation.

Any risk arising from the use of this information rests with the recipient, and nothing herein should be construed as constituting any kind of warranty.

Milestone Systems A/S reserves the right to make adjustments without prior notification.

All names of people and organizations used in the examples in this text are fictitious. Any resemblance to any actual organization or person, living or dead, is purely coincidental and unintended.

This product may make use of third-party software for which specific terms and conditions may apply. When that is the case, you can find more information in the file `3rd_party_software_terms_and_conditions.txt` located in your Milestone system installation folder.

# Overview

## What's new?

### In XProtect LPR 2025 R1

**Added vehicle properties to searches and in LPR match lists**

Milestone has added vehicle properties to XProtect LPR. Users of XProtect® LPR in XProtect Smart Client can refine their searches by specifying detailed vehicle properties, such as the make, model, and color of the vehicle.

Users can specify and adjust what vehicle properties they need in the searches on the built-in **Search** tab in XProtect Smart Client or in match lists on the **LPR** tab.

Find a full overview of vehicle properties and their associated values under Overview of vehicle properties on page 25

## XProtect LPR

XProtect LPR offers video-based content analysis (VCA) and recognition of vehicle license plates that interacts with your surveillance system and your XProtect Smart Client.

To read the characters on a plate, XProtect LPR uses optical character recognition on images aided by specialized camera settings.

You can combine LPR (license plate recognition) with other surveillance features such as recording and event-based activation of outputs.

Examples of events in XProtect LPR:

- Trigger surveillance system recordings in a particular quality

- Activate alarms

- Match against positive and negative match lists

- Open gates

- Switch on lights

- Push video of incidents to computer screens of particular security staff members

- Send mobile phone text messages

With an event, you can activate alarms in XProtect Smart Client.

## XProtect LPR system architecture

Basic data flow:
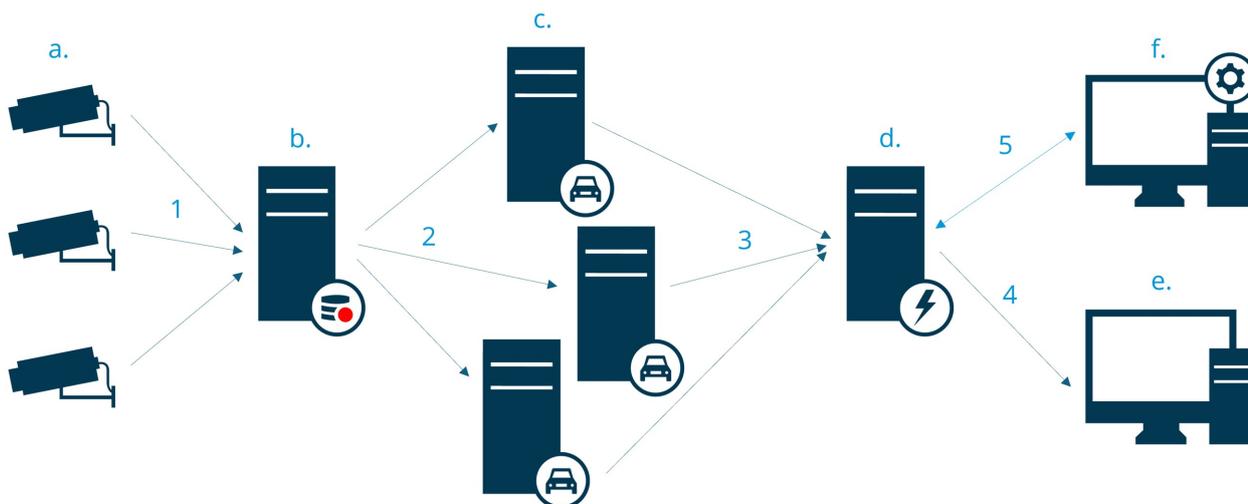
1. LPR cameras (a) send video to the recording server (b).

2. The recording server sends video to the LPR servers (c) to recognize license plates by comparing them with the license plate styles in the installed country modules.

3. LPR servers send recognitions to the event server (d) to match with the match lists.

4. The event server sends events and alarms to XProtect Smart Client (e) when there is a match.

5. The system administrator manages the entire LPR configuration, for example, setting up events, alarms, and lists in the Management Client (f).

**LPR server**

The LPR server handles LPR video recorded by your surveillance system. It analyzes the video and sends information to the event server. The event server uses the information to trigger the defined events and alarms. Milestone recommends that you install the LPR server on a computer especially allocated for this purpose.

**LPR camera**

The LPR camera captures video as any other camera, but some cameras are dedicated for LPR use. The better suited camera you use, the more successful recognitions you will get.

**Country module**

A country module is a set of rules that defines which license plates of a certain type and form belong to which country, state, or region. See how to enable country modules .

**License plate styles**

Every country module contains license plate styles. When you enable a country module, all the license plate styles that belong to that country module are also enabled.

A license plate style is a set of characteristics of a license plate, including the:

- Plate size and shape
- Text format and font
- Colors
- Type of vehicle that the license plate is used on

See a list of all license plate styles supported by XProtect LPR.

**Match list**

A match list is a list that you create. It's a collection of license plate registration numbers and license plate style aliases that you want your system to treat in a special way. After you create a match list, you can set up events to recognize license plates on these lists. The events will trigger events and alarms. See Match lists on page 46.

# Compatibility

XProtect LPR is compatible with:

- XProtect Corporate
- XProtect Expert
- XProtect Professional+
- XProtect Express+
- Milestone Husky

See also Product comparison chart.

# Licensing

## XProtect LPR licenses

XProtect LPR requires the following licenses:

- 1 **base license** for XProtect LPR. The base license covers an unrestricted number of LPR servers

- 1 **LPR camera license** per each LPR camera that you want to use in XProtect LPR

- A **LPR country module license** for each country, state, or region that you need in your XProtect LPR solution.

  5 LPR country module licenses are included with the XProtect LPR base license.

  > All country modules are automatically installed when you install your XProtect LPR product. The installed modules are by default disabled and you must enable the modules (see Country modules tab on page 40) that you want to use. You can only enable as many country modules as you have LPR country module licenses for.

**Example**

You have installed 10 country modules, but you only have 5 LPR country module licenses. After you selected the first 5 country modules, you cannot select any more. You must clear some of your selections before you can select other modules.

To find information about the current status of your licenses, see View LPR server information on page 30.

To buy additional licenses or country modules, contact your vendor.

# Requirements and considerations

## System requirements

For information about the system requirements for the various VMS applications and system components, go to the Milestone website (https://www.milestonesys.com/systemrequirements/).

> ✎ Milestone recommends that you install the LPR server on a computer especially allocated for this purpose.

## Preparing cameras for LPR (explained)

LPR differs from other kinds of video surveillance. Normally, you choose cameras based on their ability to provide the best possible images for viewing by the human eye. When you choose cameras for LPR, only the area where you expect to detect license plates is important. The clearer and consistent you capture an image in that small area, the higher recognition rate you will get.

This section helps you prepare cameras for license plate recognition, but it also introduces you to important theories about cameras and lenses that are crucial to understand in order to get optimal images.
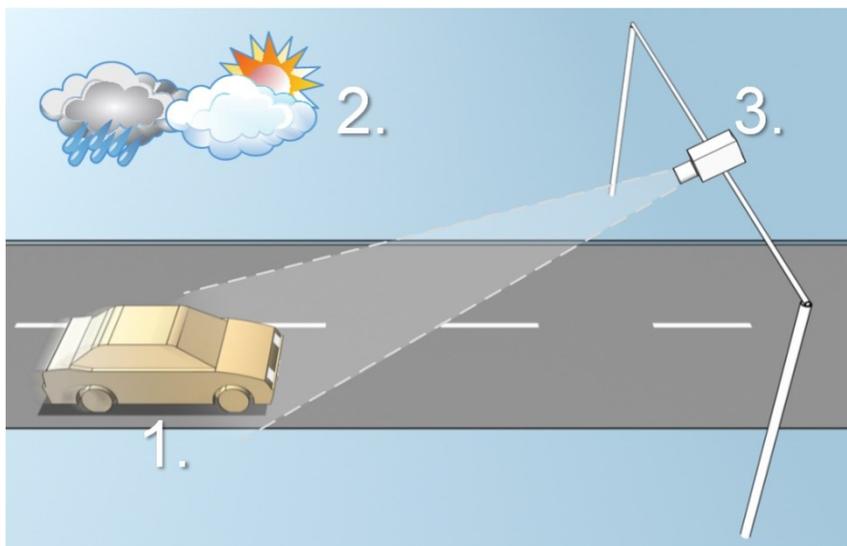


Factors that influence your configuration of LPR:

| 1. Vehicle | 2. Physical surroundings | 3. Camera |
|---|---|---|
| <ul><li>Speed</li><li>Plate size and position</li></ul> | <ul><li>Lighting conditions</li><li>Weather</li></ul> | <ul><li>Exposure</li><li>Field of view</li><li>Shutter speed</li><li>Resolution</li><li>Positioning</li></ul> |

It is important to take these factors into consideration as they have a critical influence on successful license plate recognition. You must mount cameras and configure XProtect LPR in a way that matches each specific environment. You cannot expect the product to run successfully without configuration. A camera used for LPR has a CPU consumption that is about five times higher than a normal camera. If a camera has not been set up correctly, it will greatly affect the level of successful recognitions and the CPU performance.

## Positioning the camera

When you mount cameras for LPR use, it is important to get a good, clear view of the area of interest so the plate can be detected consistently. This ensures the best possible performance and low risk of false detection:

- The area should cover only the part of the image where the license plate is visible as the vehicle moves in and out of the image

- Avoid to have objects that block the view path of the camera, such as pillars, barriers, fences, gates

- Avoid irrelevant moving objects such as people, trees, or traffic in

If too many irrelevant items are included, they will interfere with the detection, and the LPR server will use CPU resources on analyzing irrelevant items instead of license plates.
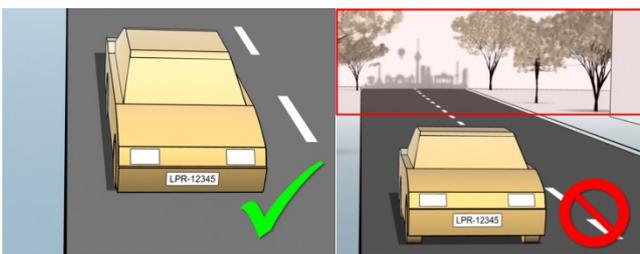


To help you obtain a clear and undisturbed view, you can:

- Mount the camera as close as possible to the area of interest

- Adjust camera angles

- Zoom. If you zoom, always use the camera's optical zoom

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 a license plate only starts when the whole plate is in the view:
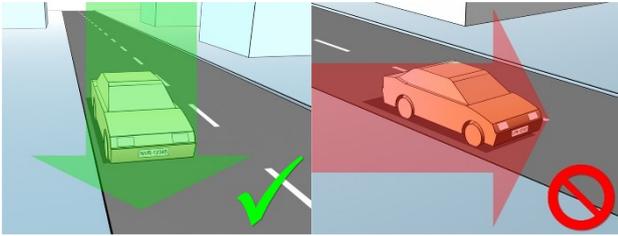


# Camera angles

**Single-line rule**

Mount the camera so that you can draw a horizontal line that crosses both the left and right edge of the license plate in the captured images. See the illustrations below for correct and incorrect angles for recognition.



**Vertical angle**

The recommended vertical view angle of a camera used for LPR is between 15°-30°.
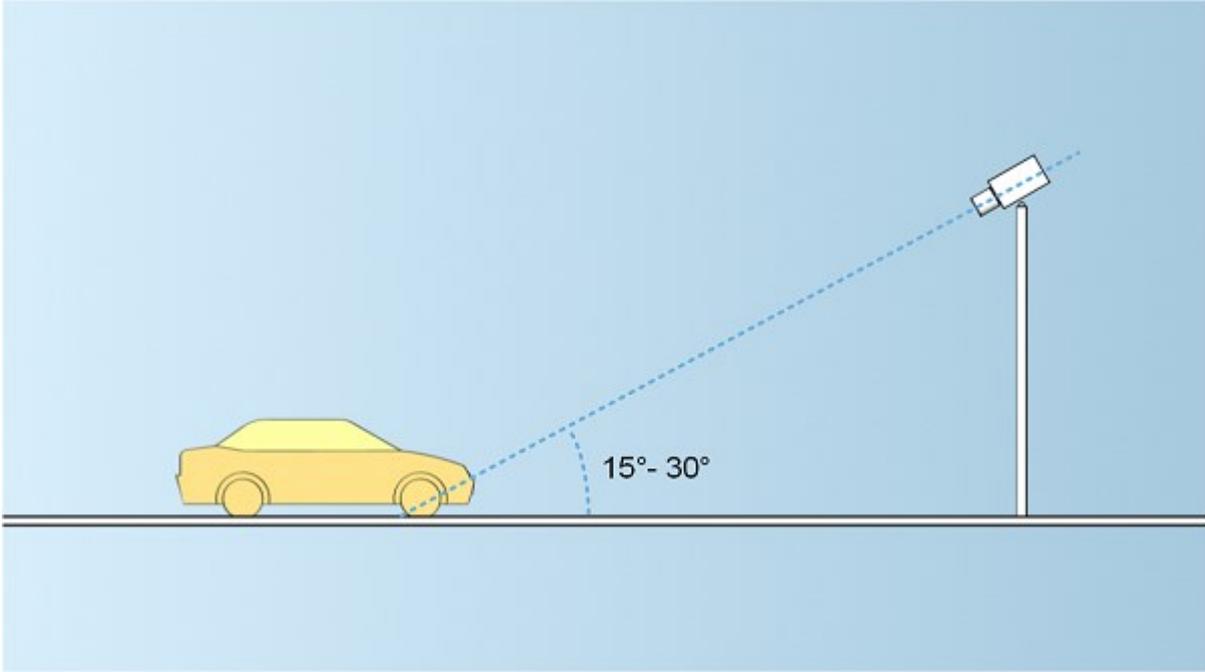
**Horizontal angle**

The recommended maximum horizontal view angle of a camera used for LPR is between 15°-25°.
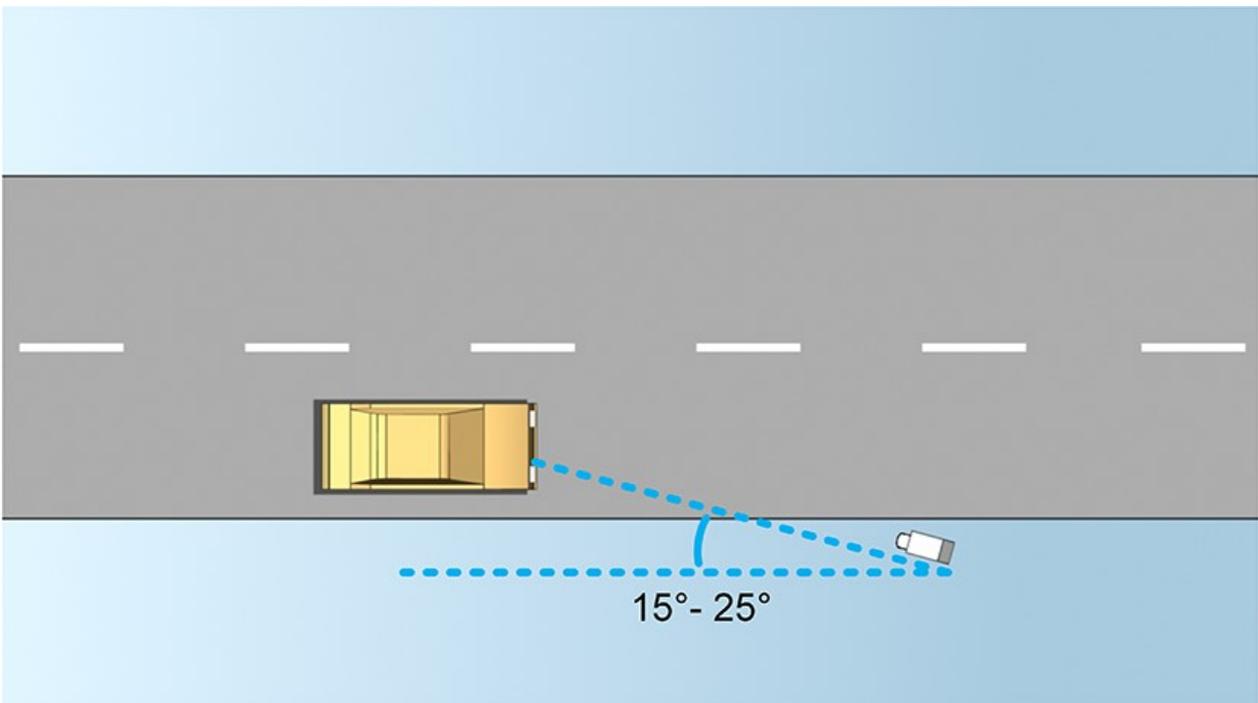
# Plate width recommendations

Mount the camera so that the ideal snapshot of the license plate is captured when the license plate is in the center or lower half of the image:
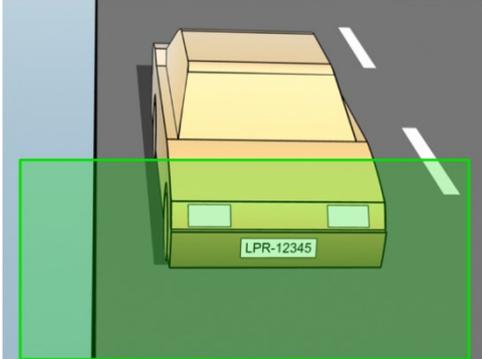


Take a snapshot and make sure that the requirements to stroke width and plate width as described below are fulfilled. Use a standard graphics editor to measure the amount of pixels. When you start the process of reaching the minimum plate width, begin with a low resolution on the camera, and then work your way up in a higher resolution until you have the required plate width.

**Stroke width**

The term pixels per stroke is used to define a minimum requirement for fonts that should be recognized. The following illustration outlines what is meant by stroke:



Because the thickness of strokes depend on the country and on the license plate style, measurements like pixels/cm or pixels/inch are not used.

The resolution for best LPR performance should be at least 2.7 pixels/stroke.

**Plate width**

| Plate type | Plate width | Setup | Minimum plate width (pixels) |
|---|---|---|---|
| Single line US plates | • Plate width 12 inches<br><br>• Stroke width around ¼ inches | Vehicles stopped; no interlacing | 130 |
|  |  | Vehicles are moving; interlaced | 215 |
| Single line European plates | • Plate width 52 cm<br><br>• Stroke width around 1 cm | Vehicles stopped; no interlacing | 170 |
|  |  | Vehicles are moving; interlaced | 280 |

If vehicles are moving when recorded, and an interlaced camera is used, only a half of the image can be used (only the even lines) for recognition compared with a camera configured for stopped vehicles and no interlacing. This means that the resolution requirements are almost double as high.

## Image resolution

Image quality and resolution is important for a successful license plate recognition. On the other hand, if the video resolution is too high, the CPU might be overloaded with the risk of skipped or faulty detections. The lower you can set the acceptable resolution, the better CPU-performance and the higher detection rate you get.

In this example we explain how to do a simple image quality calculation and find a suitable resolution for LPR. The calculation is based on the width of a car.
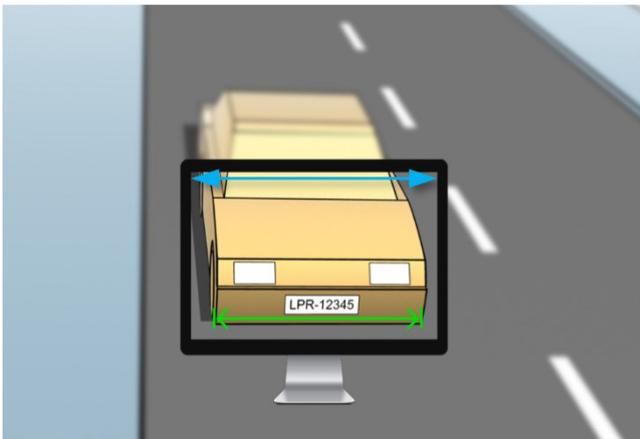
We estimate that the horizontal width is 200 cm/78 inches, as we assume the width of a standard car is 177 cm/70 inches, and besides that we add ~10% for the extra space. You can also do a physical measuring of the area of interest if you need to know the exact width.

The recommended resolution of the stroke thickness is 2.7 pixels/stroke, and the physical stroke thickness is 1 cm for a European plate and 0.27 inches for a US plate. This gives the following calculation:

**Calculation for European plates in cm**

200 × 2.7 ÷ 1 = 540 pixels

Recommended resolution = VGA (640×480)

**Calculation for US plates in inches**

78 × 2.7 ÷ 0.27 = 780 pixels

Recommended resolution = SVGA (800×600)

> Because US plates use a font with a narrow stroke, a higher resolution is needed than for European plates.

**Common video resolutions**

| Name | Pixels (width × height) |
| --- | --- |
| QCIF | 176×120 |
| CIF | 352×240 |
| 2CIF | 704×240 |
| VGA | 640×480 |
| 4CIF | 704×480 |
| D1 | 720×576 |
| SVGA | 800×600 |
| XGA | 1024×768 |
| 720p | 1280×1024 |

# Understanding camera exposure

Camera exposure determines how light/dark and sharp/blurry an image appears when it has been captured. This is determined by three camera settings: aperture, shutter speed, and ISO speed. Understanding their use and interdependency can help you to set up the camera correctly for LPR.
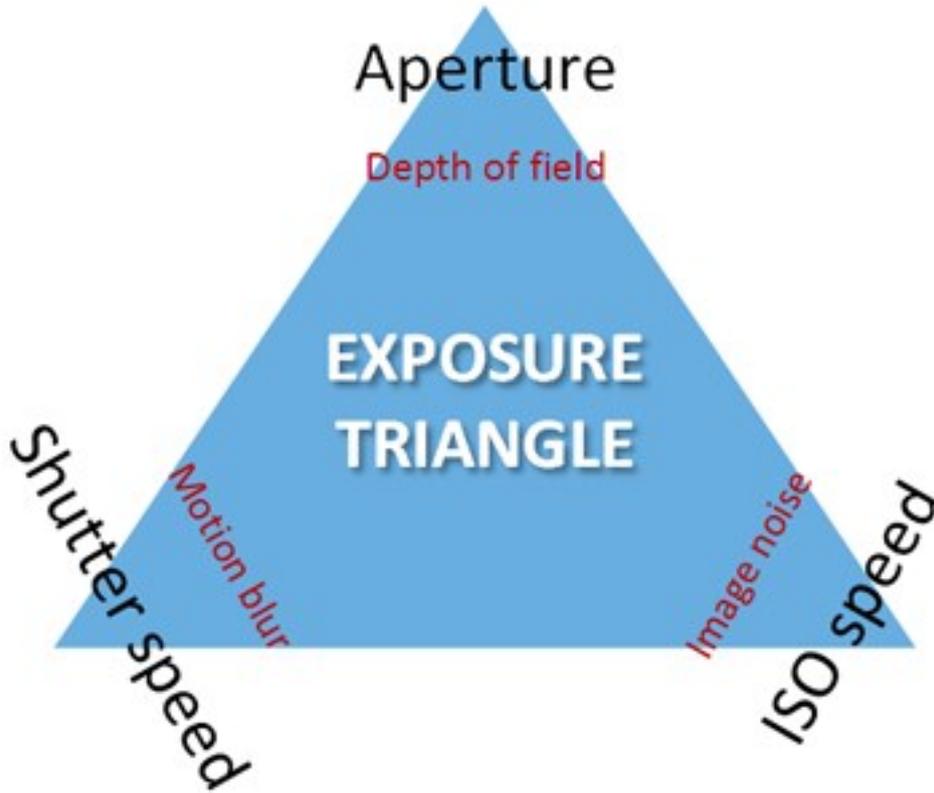


You can use different combinations of the three settings to achieve the same exposure. The key is to know which trade-offs to make, since each setting also influences the other image settings:

| Camera settings | Controls... | Affects... |
| --- | --- | --- |
| Aperture | The adjustable opening that limits the amount of light to enter the camera | Depth of field |
| Shutter speed | The duration of the exposure | Motion blur |
| ISO speed | The sensitivity of the camera's sensor to a given amount of light | Image noise |

The next sections describe how each setting is specified, what it looks like, and how a given camera exposure mode affects this combination:

**Aperture settings**

The aperture setting controls the amount of light that enters your camera from the lens. It is specified in terms of an f-stop value, which can at times be counterintuitive, because the area of the opening increases as the f-stop decreases.

Low f-stop value/wide aperture = shallow depth of field

High f-stop value/narrow aperture = large depth of field
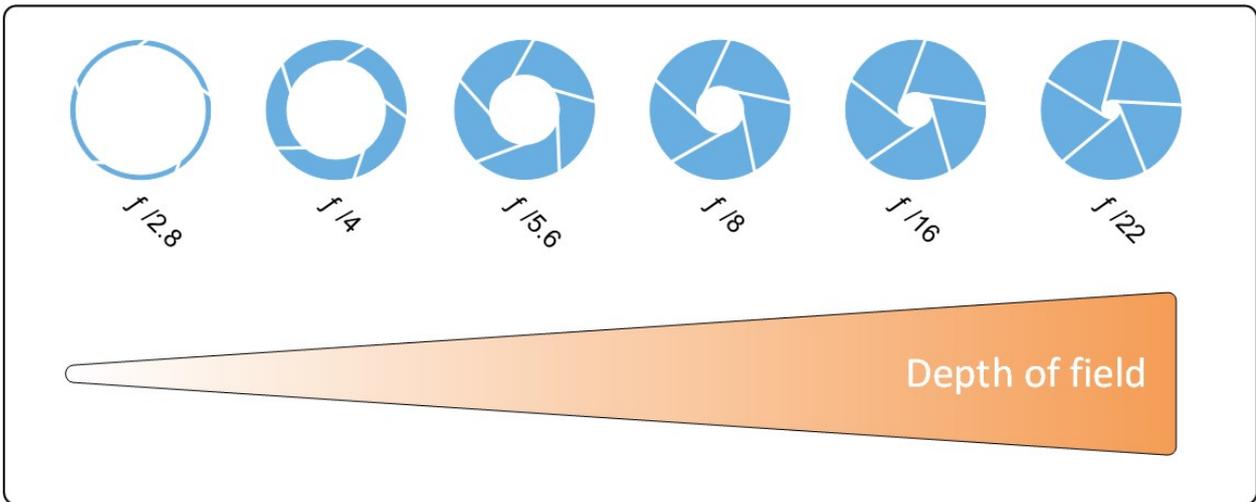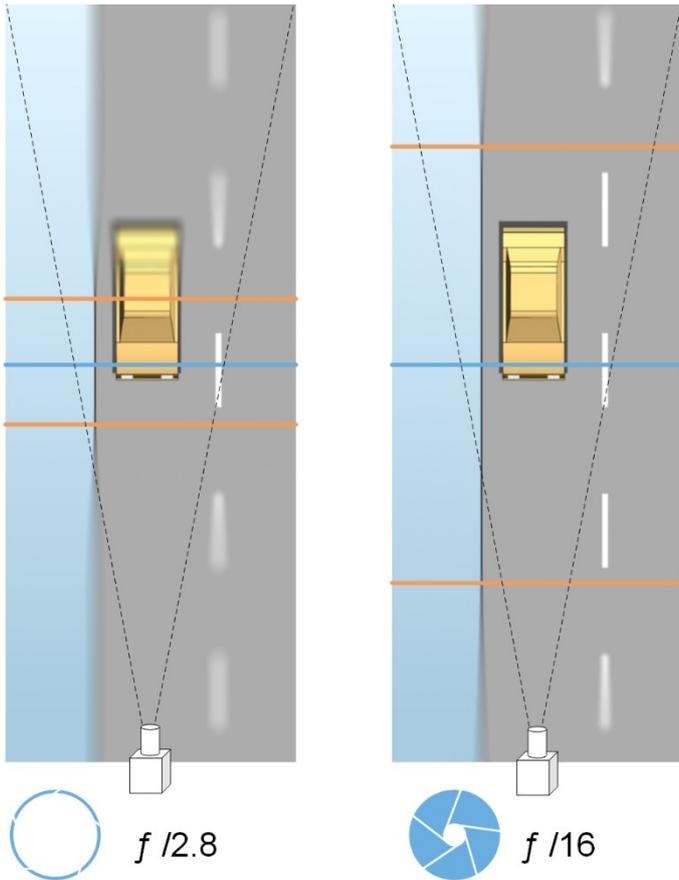
The example illustrates how the depth of field is affected by the f-stop value. The blue line indicates the focus point.

A high f-stop value makes it possible to have a longer distance where the license plate is in focus. Good light conditions are important for sufficient exposure. If lighting conditions are insufficient, the exposure time needs to be longer, which again increases the risk of getting blurry images.

A low f-stop value reduces the focus area and thereby the area used for recognition, but is suitable for conditions with low light. If it is possible to ensure that vehicles are passing the focus area at a low speed, a low f-stop value is suitable for a consistent recognition.

**Shutter speed**

A camera's shutter determines when the camera sensor is open or closed for incoming light from the camera lens. The shutter speed refers to the duration when the shutter is open and light can enter the camera. Shutter speed and exposure time refer to the same concept, and a faster shutter speed means a shorter exposure time.

Motion blur is undesired for license plate recognition and surveillance. In many occasions vehicles are in motion while license plates are detected which makes a correct shutter speed an important factor. The rule of thumb is to keep the shutter speed high enough to avoid motion blur, but not too high as this may cause under-exposed images depending on light and aperture.

**ISO speed**

The ISO speed determines how sensitive the camera is to incoming light. Similar to shutter speed, it also correlates 1:1 with how much the exposure increases or decreases. However, unlike aperture and shutter speed, a lower ISO speed is in general desirable, since higher ISO speeds dramatically increase image noise. As a result, ISO speed is usually only increased from its minimum value if the desired image quality is not obtainable by modifying the aperture and shutter speed settings solely.
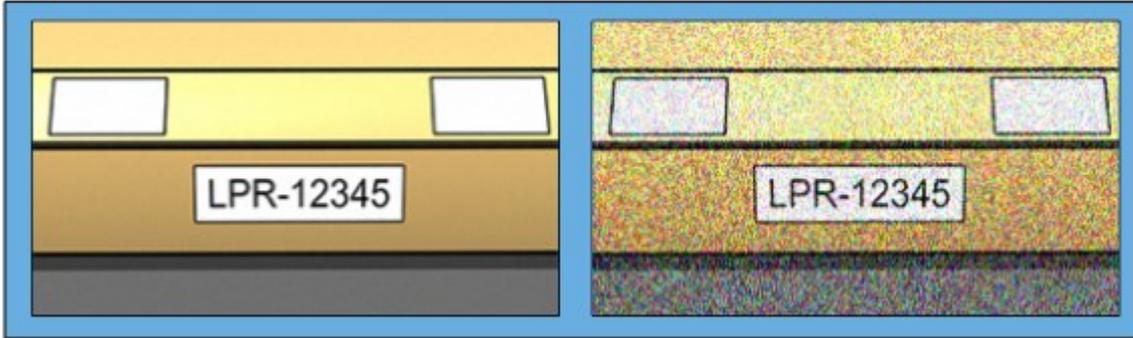


Low ISO speed image vs High ISO speed image

Common ISO speeds include 100, 200, 400 and 800, although many cameras also permit lower or higher values. With digital single-lens reflex (DSLR) cameras, a range of 50-800 (or higher) is often acceptable.

# Physical surroundings

When you mount and use cameras for LPR, note the following factors related to the surroundings:

**Too much light**

Too much light in the surroundings can lead to overexposure or smear:

- Overexposure is when images are exposed to too much light, resulting in a burnt-out and overly white appearance. To avoid overexposure, Milestone recommends that you use a camera with a high dynamic range and/or use an auto-iris lens

- Iris is the adjustable aperture. For that reason, iris has a significant effect on the exposure of images

- Smear is an effect from overexposure that leads to unwanted light vertical lines in images. It is often caused by slight imperfections in the cameras' charge-coupled device (CCD) imagers. The CCS imagers are the sensors used to digitally create the images



**Too little light**

Too little light in the surroundings or too little external lighting can lead to underexposure.

- Underexposure is when images are exposed to too little light, resulting in a dark image with hardly any contrast (see Contrast on page 23). When auto-gain (see Unwanted camera features on page 23) cannot be disabled or when you are not able to configure a maximum allowed shutter time (see Lens and shutter speed on page 22) for capturing moving vehicles, too little light will initially lead to gain noise and motion blur in the images, and ultimately to underexposure

  To avoid underexposure, use sufficient external lighting and/or use a camera that has sufficient sensitivity in low-light surroundings without using gain

- Infrared is another way to overcome difficult lighting conditions. You can use artificial infrared lighting combined with an infrared-sensitive camera with an infrared pass filter. Retro-reflective license plates are particularly suitable for use with infrared lighting:

  - Retro-reflectivity is achieved by covering surfaces with a special reflective material which sends a large portion of the light from a light source straight back along the path it came from. Retro-reflective objects appear to shine much more brightly than other objects. This means that at night they can be seen clearly from considerable distances. Retro-reflectivity is frequently used for road signs, and is also used for different types of license plates

- Weather conditions, such as snow or very bright sunlight may for example require special configuration of cameras

- License plate condition: Vehicles may have damaged or dirty license plates. Sometimes this is done deliberately in an attempt to avoid recognition

# Lens and shutter speed

When configuring camera lenses and shutter speeds for LPR, note the following:

- Focus: Always make sure the license plate is in focus

- Auto-iris: If using an auto-iris lens, always set the focus with the aperture as open as possible. In order to make the aperture open, you can use neutral density (ND) filters or—if the camera supports manual configuration of the shutter time—the shutter time can be set to a very short time

  - Neutral Density (ND) filters or gray filters basically reduce the amount of light coming into a camera. They work as "sunglasses" for the camera. ND filters affect the exposure of images (see Understanding camera exposure on page 17)

- Infrared: If using an infrared light source, focus may change when switching between visible light and infrared light. You can avoid the change in focus by using an infrared compensated lens, or by using an infrared pass filter. If you use an infrared pass filter, an infrared light source is required—also during daytime

- Vehicle speed: When vehicles are moving, cameras' shutter time should be short enough to avoid motion blur. A formula for calculating the longest suitable shutter time is:

  - Vehicle speed in km/h: Shutter time in seconds = 1 second / (11 × max vehicle speed in kilometers per hour)

  - Vehicle speed in mph: Shutter time in seconds = 1 second / (18 × max vehicle speed in miles per hour)

  where / denotes "divided by" and × denotes "multiplied by."

The following table provides guidelines for recommended camera shutter speeds for different vehicle speeds:

| Shutter time in seconds | Maimum vehicle speed in kilometers per hour | Maximum vehicle speed in miles per hour |
|---|---|---|
| 1/50 | 4 | 2 |
| 1/100 | 9 | 5 |
| 1/200 | 18 | 11 |
| 1/250 | 22 | 13 |
| 1/500 | 45 | 27 |

| Shutter time in seconds | Maimum vehicle speed in kilometers per hour | Maximum vehicle speed in miles per hour |
|---|---|---|
| 1/750 | 68 | 41 |
| 1/1000 | 90 | 55 |
| 1/1500 | 136 | 83 |
| 1/2000 | 181 | 111 |
| 1/3000 | 272 | 166 |
| 1/4000 | 363 | 222 |

## Contrast

When you determine the right contrast for your LPR camera, consider the difference in gray value (when images are converted to 8-bit grayscale) between the license plate's characters and the license plate's background color:

| Good contrast | Acceptable contrast; recognition is still possible |
|---|---|
| LPR-12345 | LPR-12345 |

Pixels in an 8-bit grayscale image can have color values ranging from 0 to 255, where grayscale value 0 is absolute black and 255 is absolute white. When you convert your input image to an 8-bit grayscale image, the minimum pixel value difference between a pixel in the text and a pixel in the background should be at least 15.

Noise in the image (see Unwanted camera features on page 23), the use of compression (see Unwanted camera features on page 23), the light conditions, and similar can make it difficult to determine the colors of a license plate's characters and background.

## Unwanted camera features

When you configure cameras for LPR, note the following:

**Automatic gain adjustment**

One of the most common types of image interference caused by cameras is gain noise.

- Gain is the way that a camera captures a picture of a scene and distributes light into it. If light is not distributed optimally in the image, the result is gain noise.



  Controlling gain requires that complex algorithms are applied, and many cameras have features for automatically adjusting gain. Unfortunately, such features are rarely helpful in connection with LPR. Milestone recommends that you configure your cameras' auto-gain functionality to be as low as possible. Alternatively, disable the cameras' auto-gain functionality.

  In dark surroundings, you can avoid gain noise by installing sufficient external lighting.

**Automatic enhancement**

Some cameras use contour, edge or contrast enhancement algorithms to make images look better to the human eye. Such algorithms can interfere with the algorithms used in the LPR process. Milestone recommends that you disable the cameras' contour, edge and contrast enhancement algorithms whenever possible.

**Automatic compression**

High compression rates can have a negative influence on the quality of license plate images. When a high compression rate is used, more resolution (see Plate width recommendations on page 14) is required in order to achieve optimal LPR performance. If a low JPEG compression is used, the negative impact on LPR is very low, as long as the images are saved with a JPEG quality level of 80% or above, and images have normal resolution, contrast and focus as well as a low noise level.

| Acceptable | Unacceptable |
|---|---|
|  |  |
| License plate image saved with a JPEG quality level of 80% (i.e. low compression). | License plate image saved with a JPEG quality level of 50% (i.e. high compression). |

# Overview of vehicle properties

Users of XProtect® LPR in XProtect Smart Client can refine their searches by specifying detailed vehicle properties.

Users can specify and adjust vehicle properties through the built-in **Search** tab in XProtect Smart Client or the LPR tab, which is added to the XProtect Smart Client user interface during the installation of XProtect® LPR.

By including detailed properties like make, model, color, type, or side in searches, users can:

- Focus their search on finding the relevant vehicles.

- Track incidents more efficiently.

- Monitor activity effectively.

- Quickly access more accurate data about the vehicle.

All vehicle properties are available to users in XProtect Smart Client when XProtect® LPR has been installed. No configuration is required.

Find the details about the available vehicle properties and their associated values in these sections.

> ✎ Currently, the detection accuracy for XProtect® LPR is highest for vehicles produced in Europe. For optimal circumstances for recognition, the full front and rear of the vehicle must be visible in the camera.

> ⚠ Milestone cannot guarantee accuracy in detecting the listed vehicle properties. The quality of your organization's hardware, configuration, camera setup, and environmental conditions can affect your results.

## Types of vehicle properties

XProtect LPR includes the following vehicle properties.

| Property | Definition |
|----------|-----------|
| Make | The manufacturer or brand of the vehicle (such as BMW, Saab, or Kia). |
| Model | The specific vehicle model associated with the make (such as Ford Transit or Citroën Berlingo). |

| Property | Definition |
|---|---|
| Type | The general type or category of the vehicle (such as car, motorcycle, or bus). |
| Color | The primary exterior color of the vehicle (such as red, black, or blue). |
| Side | The visible side of the vehicle that XProtect LPR has captured (such as front or rear). |

## Overview of vehicle property values

The table below includes a complete overview of vehicle property values for make, model, type, color, and side.

| Property | Values |
|---|---|
| Make | Undetectable, Unknown, Alfa Romeo, Audi, BMW, Burg, Chevrolet, Chrysler, Citroen, Dacia, Daewoo, DAF, Daihatsu, Dodge, Fiat, Floor, Ford, Groenewegen, H.T.F, Hapert, Honda, Hyundai, Iveco, Jaguar, Jeep, Kia, Krone, LAG, Lancia, Land Rover, Lexus, MAN, Mazda, Mercedes-Benz, Mini, Mitsubishi, Nissan, Opel, Pacton, Peugeot, Porsche, Renault, Saab, Scania, Schmitz, Schmitz Cargobull, Seat, Skoda, Smart, Subaru, Suzuki, Tesla, Toyota, Van Eck, Van Hool, Volkswagen, Volvo. |
| Model | Undetectable, Unknown, Alfa Romeo - 147, Alfa Romeo - Alfa Giulietta, Alfa Romeo - Mito, Audi - A1, Audi - A3, Audi - A4, Audi - A5, Audi - A6, Audi - TT, BMW - 1, BMW - 116i, BMW - 3, BMW - 320ed, BMW - 320i, BMW - 5, BMW - 520d, BMW - X, Chevrolet - Spark, Citroen - Berlingo, Citroen - C1, Citroen - C2, Citroen - C3, Citroen - C4, Citroen - C5, Citroen - DS3, Citroen - Xsara Picasso, Dacia - Logan, Dacia - Sandero, DAF - CF 400 FT, DAF - FAR XF105, DAF - FTG XF105, DAF - FTP XF105, DAF - FT CF85, DAF - FT XF, DAF - FT XF105, DAF - FT XF 105, DAF - XF 440 FT, DAF - XF 460 FT, Daihatsu - Cuore, Daihatsu - Sirion, Fiat - 500, Fiat - Doblo, Fiat - Ducato, Fiat - Panda, Fiat - Punto, Ford - C-Max, Ford - Fiesta, Ford - Focus, Ford - Focus C-Max, Ford - Fusion, Ford - Galaxy, Ford - Ka, Ford - Mondeo, Ford - S-Max, Ford - Transit, Honda - Civic, Honda - Insight, Honda - Jazz, Hyundai - Getz, Hyundai - i20, Hyundai - ix35, Hyundai - i10, Hyundai - i30, Hyundai - Tucson, Iveco - AS440T/P, Kia - Cee'd, Kia - Picanto, Kia - Rio, Kia - Sportage, Krone - N A, Krone - SD, Lexus - CT200h, MAN - TGS, MAN - TGX, Mazda - 2, Mazda - 3, Mazda - 6, Mazda - CX-5, Mercedes-Benz - 639 Vito 109 CDI, Mercedes-Benz - A, Mercedes-Benz - Actros, Mercedes-Benz - B, Mercedes-Benz - C, Mercedes-Benz - Citan, Mercedes-Benz - E, |

| Property | Values |
|---|---|
| | Mercedes-Benz - Sprinter, Mercedes-Benz - Vito, Mini - Cooper, Mini - Mini, Mitsubishi - Colt, Mitsubishi - Outlander, Mitsubishi - Space Star, Nissan - Micra, Nissan - Note, Nissan - Qashqai, Opel - Agila, Opel - Ampera, Opel – Astra, Opel - Combo Van, Opel - Corsa, Opel - Insignia Sports Tourer SW, Opel - Meriva, Opel - Movano, Opel - Vivaro, Opel - Zafira, Peugeot - 107, Peugeot - 2008, Peugeot - 206, Peugeot - 207, Peugeot - 208, Peugeot - 3008, Peugeot - 307, Peugeot - 308, Peugeot - 407, Peugeot - 5008, Peugeot - 508, Peugeot - Expert, Peugeot - Partner, Renault - Captur, Renault - Clio, Renault - Espace, Renault - Kangoo, Renault - Laguna, Renault - Master, Renault - Megane, Renault - Megane Scenic, Renault - Modus, Renault - T, Renault - Trafic, Renault - Twingo, Saab - 9-3, Saab - 9-5, Scania - R410, Scania - R450, Scania - R 420 A 4x2, Scania - R 440 A 4x2, Schmitz - Unknown, Seat - Altea, Seat - Ibiza, Seat - Leon, Seat - Mii, Skoda - Fabia, Skoda - Octavia, Skoda - Superb, Suzuki - Alto, Suzuki - Swift, Suzuki - SX4, Toyota - Auris, Toyota - Avensis, Toyota - Aygo, Toyota - Corolla, Toyota - Prius, Toyota - RAV4, Toyota - Yaris, Volkswagen - Caddy, Volkswagen - Crafter, Volkswagen - Fox, Volkswagen - Golf, Volkswagen - Jetta, Volkswagen - Lupo, Volkswagen - Passat, Volkswagen - Polo, Volkswagen - Tiguan, Volkswagen - Touran, Volkswagen - Transporter, Volkswagen - Up, Volvo - C30, Volvo - FH, Volvo - FM, Volvo - S, Volvo – V, Volvo – XC. |
| Type | Undetectable, Unknown, bus, motorcycle, car, truck, van. |
| Color | Undetectable, Unknown, black, blue, gray, green, red, white, yellow. |
| Side | Undetectable, Unknown, front, rear. |

# Installation

## Install XProtect LPR

**Considerations**

To run XProtect LPR, you must install:

- At least one LPR server

- The XProtect LPR plug-in on all computers that run the Management Client, the event server, and XProtect Smart Client

- Make sure that the user selected for running the LPR Server service can access the Management Client

> ✏️ Milestone recommends that you install the LPR server on a different computer than your management server or recording servers.

> ⚠️ If you install the LPR server on a different computer, you must add the **Windows user** to the **Administrators** role in XProtect.

**Start installation**

1. On the download page of the Milestone website (https://www.milestonesys.com/download/), download the two installers:

    - Milestone XProtect LPR Plug-in Installer to all computers that run the Management Client and the event server

    - Milestone XProtect LPR Server Installer to all computers allocated for this purpose. You can also create virtual servers for LPR on one computer

2. First, run all the *Milestone XProtect LPR Plug-in* installers.

3. Then, run the *Milestone XProtect LPR Server* installer(s).

   During installation:

   1. Specify the IP address or host name of the management server or image server including the domain user name and password of a user account that has administrator rights to the surveillance system.

   2. For secure communication:

      - Select the certificate used to connect to the management server

      - Select the certificate used to connect to the event server

      For more information, see the certificates guide about how to secure your XProtect VMS installations.

   3. Select the service account. If the computer is part of a domain, the service must run as either a predefined Network Service or a domain user account.

4. Launch the Management Client.

   In the **Site Navigation pane**, your Management Client automatically lists the installed LPR servers in the **LPR Servers** list.

5. Make sure that you have the necessary licenses (see XProtect LPR licenses on page 9).

6. All country modules are automatically installed when you install your XProtect LPR product. However, the installed modules are by default disabled and you must enable the modules (see Country modules tab on page 40) that you want to use. You can only enable as many country modules as you have LPR country module licenses for.

You cannot add LPR servers from the Management Client.

If you need to install more LPR servers after the initial installation, run the *Milestone XProtect LPR Server* Installer on these computers.

> ✏️  If an antivirus program is installed on a computer running XProtect software, it is important that you exclude the `C:\ProgramData\Milestone\XProtect LPR` folder. Without implementing this exception, virus scanning uses a considerable amount of system resources and the scanning process can temporarily lock files.

# Configuration

## View LPR server information

To check the state of your LPR servers:

1.  In the **Site Navigation pane** > **Servers**, select **LPR servers**.

    In the **LPR server information** window, see an overview of all installed LPR servers and their name, host name, and status.

2.  Select an LPR server.

    In the **LPR server information** window, see details about the server.

### LPR server information properties

| Field | Description |
|---|---|
| **Name** | Here you can change the name of the LPR server. |
| **Host name** | Shows the LPR server host name.<br><br>The first part of the name of the LPR server consists of the name of the host computer for your LPR server installation. Example: `MYHOST.domainname.country`. |
| **Status** | Shows the status of the LPR server.<br><br>If the server has just been added, the status is:<br><br><ul><li>No LPR cameras configured</li></ul>If the system is running without problems, the status is:<br><br><ul><li>All LPR cameras are running</li></ul>Alternatively, the system returns:<br><br><ul><li>Service not responding</li><li>Not connected to surveillance system</li><li>Service not running</li><li>Event Server not connected</li></ul> |

| Field | Description |
|---|---|
| | • Unknown error<br><br>• X of Y LPR cameras running |
| **Service up time** | Shows the up time since the LPR server was last down and the LPR Server service started. |
| **Computer CPU usage** | Shows the current CPU usage on the entire computer with the LPR server(s) installed. |
| **Memory available** | Shows how much memory is available on the LPR server. |
| **Recognized license plates** | Shows the number of license plates that the LPR server has recognized in this session. |
| **LPR cameras** | Shows a list of enabled LPR cameras that run on the LPR server and their status. |
| **LPR cameras available** | Based on your license, this number shows how many additional LPR cameras you are allowed to add and use on all your LPR servers in total. |
| **Country modules available** | Based on your license, this number shows how many additional country modules you are allowed to use on all your LPR servers in total. It also lists the number of country modules already in use. |

# Configuring cameras for LPR

This article describes the steps to go through when you add and configure cameras used with XProtect LPR.

## Requirements for LPR in the Management Client

Once cameras have been mounted and added in the Management Client, adjust each camera's settings so that they match the requirements for LPR. You adjust camera settings on the properties tabs for each camera device.

For the relevant cameras, Milestone recommends to:

- Set the video codec to JPEG

> ✏️ For LPR use, H.264 codec is not recommended and H.265 is not supported. Disadvantages using these codecs include delays in the stream processing and unnecessary extra CPU load on the server. Therefore, Milestone recommends that you always use JPEG video streams for LPR cameras.

- Specify a frame rate of four frames per second

- Avoid compression, so set a fine quality

- If possible, specify a resolution below one megapixel

- If possible, keep automatic sharpness at a low level

To learn about LPR fundamentals, make yourself familiar with the information in Preparing cameras for LPR (explained) on page 10.

## Snapshots (explained)

The system uses snapshots to optimize the configuration automatically and to visualize the effect of the recognition settings as they are applied.

You need to provide at least one valid snapshot in order to complete the initial configuration of a camera.

As a guideline, capture snapshots of vehicles in the real physical surroundings and conditions, in which you want to be able to recognize license plates.

The list below illustrates examples of the situations that you should consider when you capture and select snapshots. Not all may be applicable to your surroundings.

Milestone recommends that you select minimum 5-10 snapshots that represent typical conditions of:

**The weather; for example, sunlight and rain**
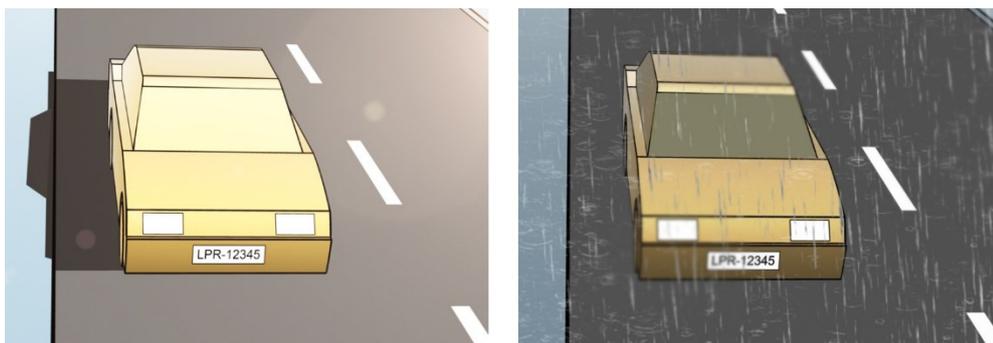


**The light; for example, daylight and nighttime**
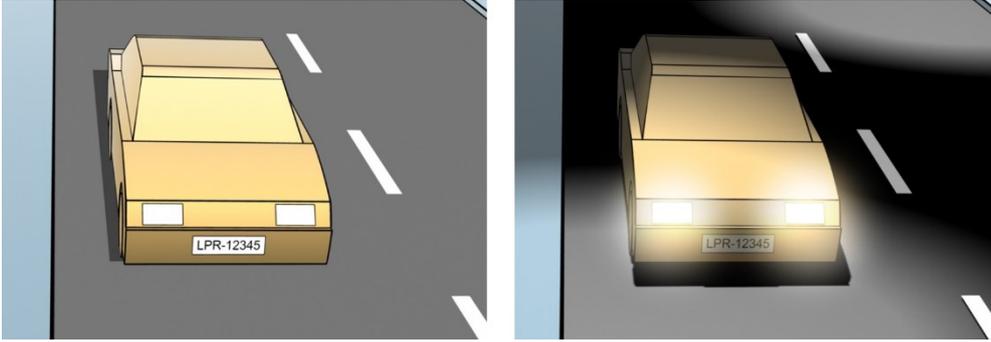
**Vehicle types; to define the top and bottom of the recognition area**



**Position in the lane; to define the left and right of the recognition area**



**Distance to the car; to define the area where LPR analyzes license plates**

# Add LPR camera

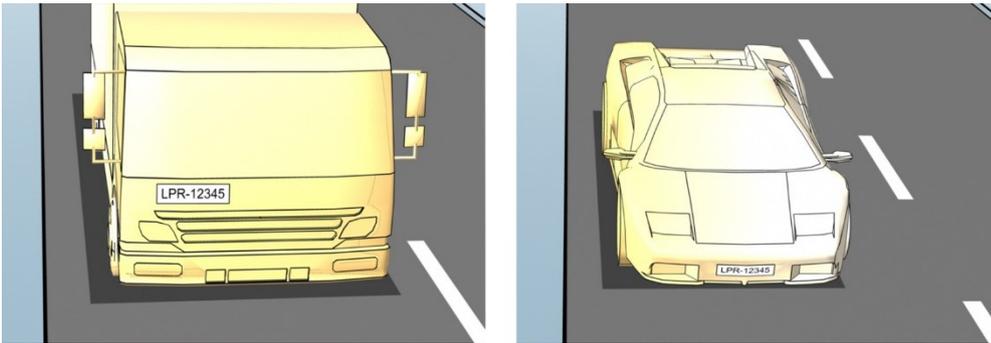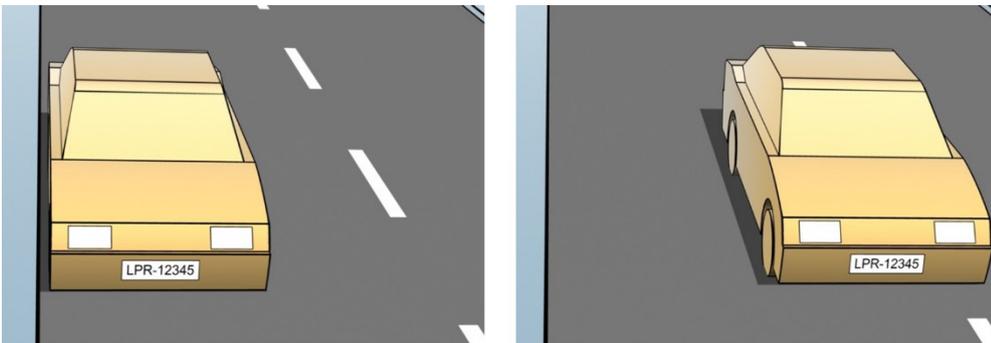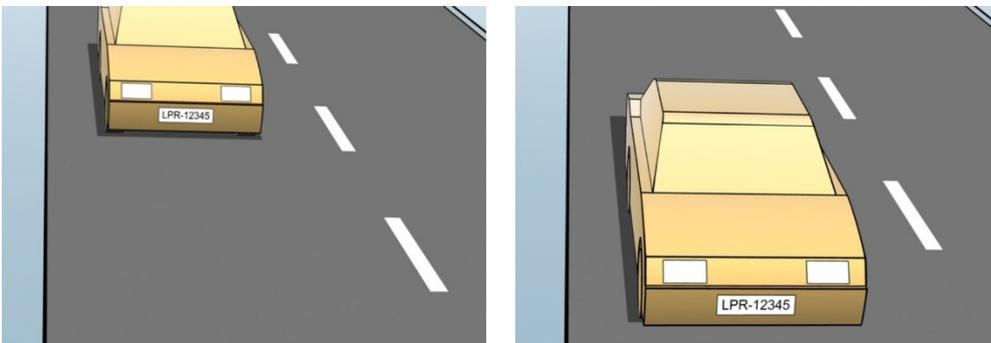To configure cameras for LPR, you initially run the **Add LPR camera** wizard. The wizard takes you through the main configuration steps and automatically optimizes the configuration.

To run the wizard:

1. In the **Site Navigation** pane, select **Servers** > **LPR servers** > **LPR cameras**.

2. Right-click the server and select **Add LPR camera**.

3. Follow the instructions in the wizard:

   - Select the camera you want to configure for LPR

   - Select which country modules you want to use with your LPR camera (see Country modules tab on page 40)

   - Select snapshots to use for validating the configuration (see Snapshots (explained) on page 32)

   - Validate the result of the snapshot analysis (see Validate configuration on page 44)

   - Select which match lists to use (see Match lists on page 46). Choose the default selection, if you have not yet created any lists

4. On the last page, click **Close**.

   The LPR camera appears in the Management Client and based on your selections, the system has optimized the recognition settings for the camera (see Add LPR camera on page 34).

5. Select the camera you have added and review its settings. You only need to change the configuration if the system does not recognize license plates as well as expected.

6. In the **Recognition settings** tab, click Validate configuration (see Validate configuration on page 44).

# Adjust settings for your LPR camera

The system automatically optimized the configuration of your LPR camera, when you added the LPR camera with the **Add LPR camera** wizard. If you want to make changes to the initial configuration, you can:

- Change the name of the server or change server (see Info tab on page 34)

- Adjust and validate the recognition settings (see Recognition settings tab on page 35)

- Add more match lists (see Match lists tab on page 39)

- Enable additional country modules (see Country modules tab on page 40)

### Info tab

This tab provides information about the selected camera:

| Name | Description |
|------|-------------|
| **Enable** | LPR cameras are by default enabled after the initial configuration. Disable any camera that is not used in connection with LPR.<br><br>Disabling an LPR camera does not stop it from performing normal recording in the surveillance system. |
| **Camera** | Shows the name of the selected camera as it appears in the XProtect Management Client and the clients. |
| **Description** | Use this field to enter a description (optional). |
| **Change Server** | Click to change LPR server.<br><br>Changing the LPR server can be a good idea if you need to load balance. For example, if the CPU load is too high on an LPR server, Milestone recommends that you move one or more LPR cameras to another LPR server. |

## Recognition settings tab

Change recognition settings manually. Based on the snapshots you provided, the system auto-configured the recognition settings. Changing these settings can greatly affect the recognition success rate.

### Action buttons

Change, update, and validate auto-configured settings.

| Name | Description |
|------|-------------|
| **Validate configuration** | Test that license plates are recognized as expected (see Validate configuration on page 44). |
| **Auto-configure** | Discard manual changes and auto-configure settings (see Auto-configure on page 45). |
| **Snapshots** | Add or delete snapshots (see Select snapshots on page 43). |

**Recognition area**

To ensure best performance and avoid false recognitions, Milestone recommends that you select a clearly defined and "well-trimmed" recognition area. The area should cover only the part of the image where the license plate is visible and remains visible as the vehicle moves in and out of the image. Avoid irrelevant moving objects (people, trees, traffic) in the recognition area (see Positioning the camera on page 11).

License plates are not recognized in the red area.
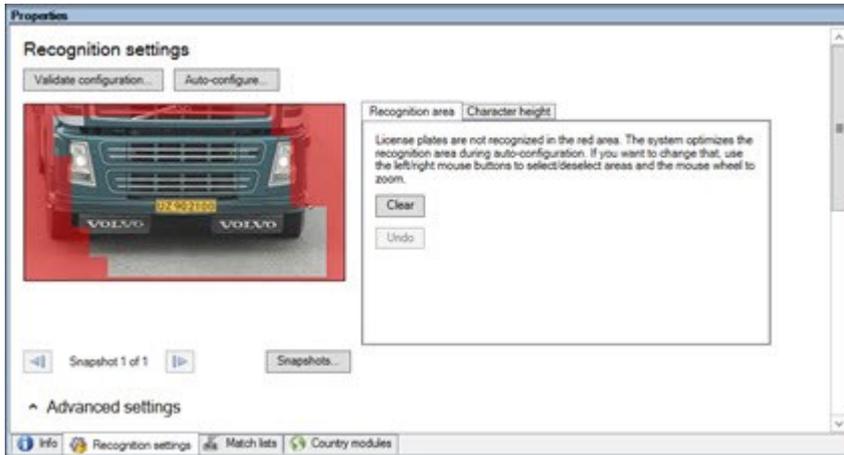


When specifying a recognition area, you can click:

- **Clear** to remove all selections and select new areas for LPR

- **Undo** to revert to your last saved recognition area

After changing the settings for your LPR camera, validate your configuration (see Validate configuration on page 44) to check if the system recognizes license plates as well as expected.

**Character height**

Define the minimum and maximum height of the license plate characters (in percent). Select character heights as close as possible to the height of the characters in the real license plate.

These character settings affect the recognition time and process. The smaller the difference between the minimum and the maximum character height:

- The smoother the LPR process

- The lower the CPU load

- The sooner you get the results

The overlay in the snapshot displays the currently defined character height setting. The overlay grows and shrinks proportionally to the character height settings to the right. For easy comparison, drag the overlay on top of the real license plate in the snapshot. Zoom with your mouse wheel for a closer look.

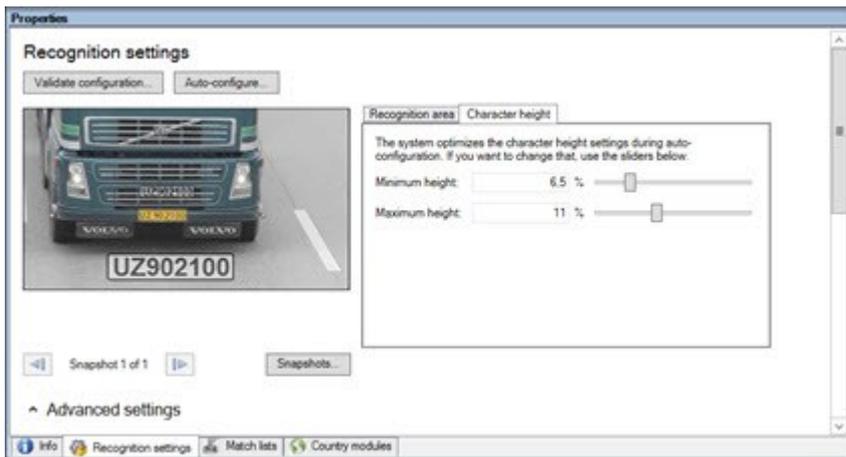| Name | Description |
| --- | --- |
| **Minimum height** | Set the minimum character height for including license plates in the recognition process. If the real license plate characters are smaller than the value you specify, the system will not start the recognition process. |
| **Maximum height** | Set the maximum character height for including license plates in the recognition process. If the real license plate characters are bigger than the value you specify, the system will not start the recognition process. |

After changing the settings for your LPR camera, validate your configuration (see ) to check if the system recognizes license plates as well as expected.

**Advanced settings**

The recognition process has two steps: 1) finding the plate(s) and 2) recognizing the characters in the plates. Click **Advanced settings** to define a trade-off between processing speed and recognition quality.

High recognition quality:

- Needs higher computational effort

- Increases CPU load

- Takes more time to return results
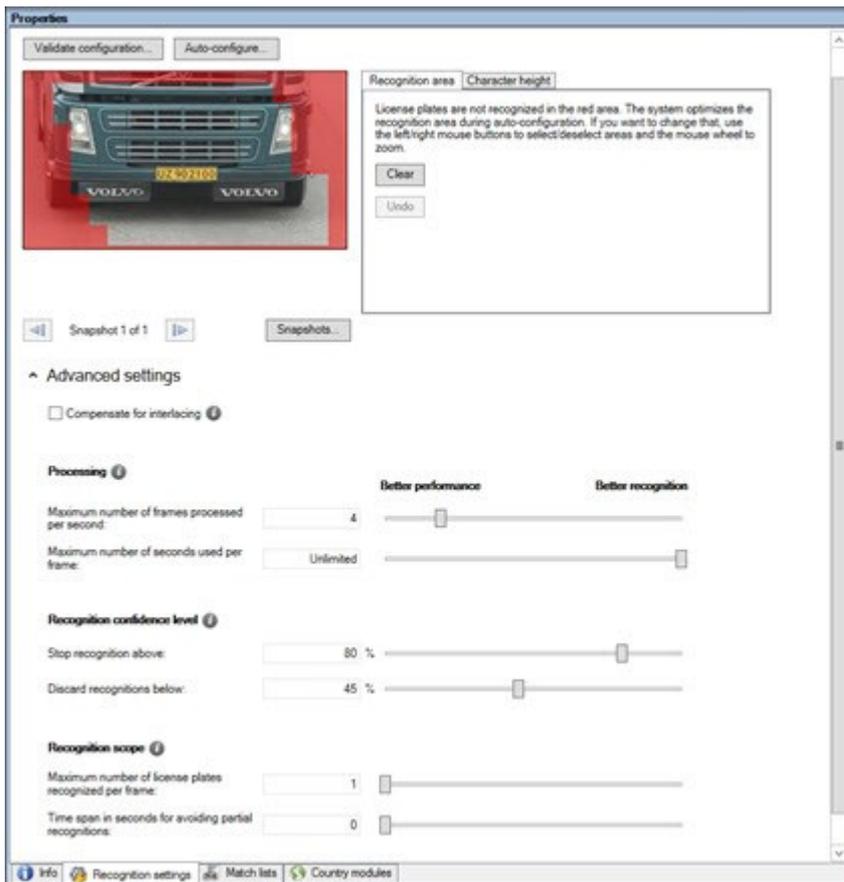
When the optimal results are met, the recognition process stops and returns the license plate it recognized at that point.

| Name | Description |
|---|---|
| **Compensate for interlacing** | If your LPR camera records interlaced video, and you see a combing effect in the de-interlaced image in LPR, select this check box. This may improve image quality and recognition results. |
| **Maximum number of frames processed per second** | Limit the number of frames your system processes every second. If you keep this setting low, you can increase the frame rate on your camera without adding unnecessary load to your LPR server.<br><br>**Unrestricted**: Remove the top limit. You will risk increasing the processing time and the CPU load. |
| **Maximum** | Limit the number of seconds your LPR can spend on recognizing one frame. If |

| Name | Description |
|------|-------------|
| **number of seconds used per frame** | adjusted, the recommended value is 0.2 seconds per frame.<br><br>**Unlimited**: Remove the top limit. You will risk increasing the processing time and the CPU load. |
| **Stop recognition above** | Stop recognition when a license plate is recognized with a confidence level equal to or above the value you specify. |
| **Discard recognitions below** | Discard recognitions with a confidence level below the value you specify. Increase this value to get fewer but possibly more accurate recognitions. Decrease this value to get more but potentially less accurate recognitions.<br><br>The smaller the difference between **Stop recognition above** and **Discard recognitions below** values, the lower the processing time and the CPU load. |
| **Maximum number of license plates recognized per frame** | Recognize several license plates simultaneously. For example, relevant for cameras recording multi-lane roads, where many license plates must be recognized at the same time.<br><br>**Unrestricted**: Remove the top limit. You will risk increasing the processing time and the CPU load. |
| **Time span in seconds for avoiding partial recognitions** | Delay all recognitions for the time period you specify. This is to avoid that the same license plate is recognized several times as different license plates. The system will wait for a better recognition and only accept the most complete recognition.<br><br>✏️ Before changing this setting, ensure no irrelevant moving objects (see Camera angles on page 12) block the view of your LPR camera. |

After changing the settings for your LPR camera, validate your configuration (see Validate configuration on page 44) to check if the system recognizes license plates as well as expected.

## Match lists tab

On this tab, select which match list(s) you want a specific LPR camera to match license plates against. You can create as many lists as you need (see Add new match lists on page 47).
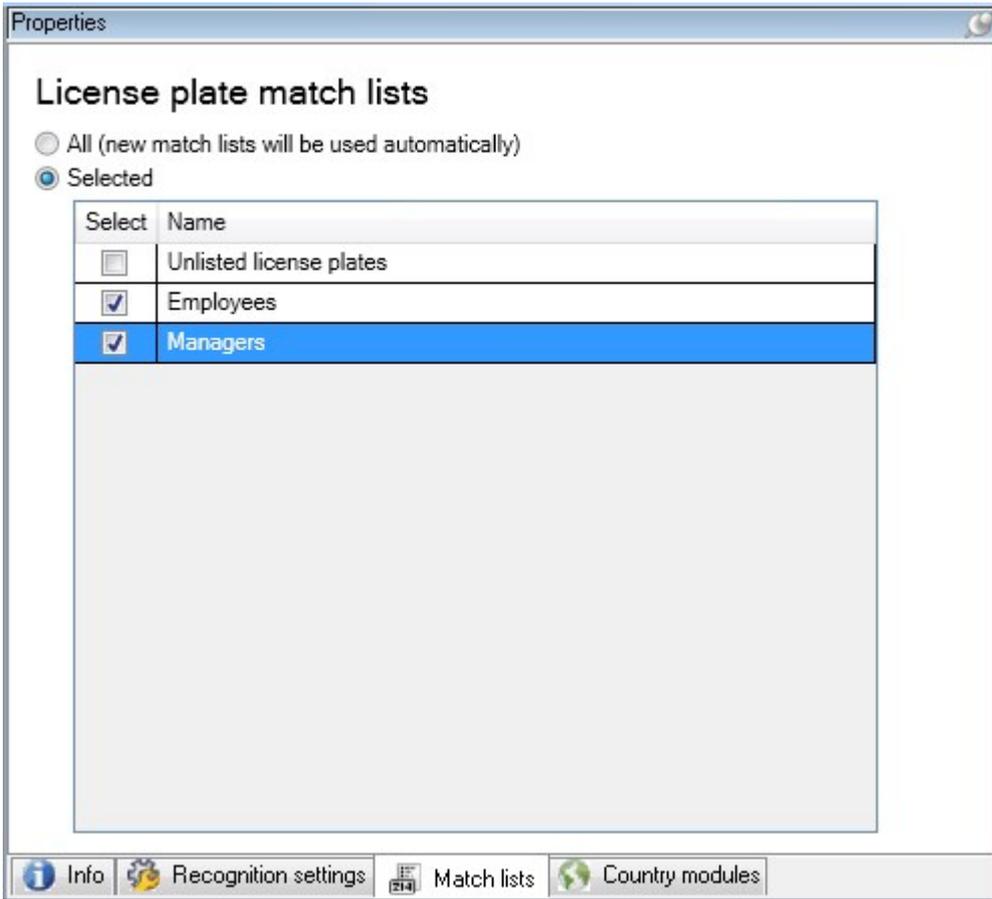
| Name | Description |
|------|-------------|
| **All** | License plates are matched against all available and future lists. |
| **Selected** | License plates are matched against the selected lists only. Select one or more from the available lists. |

After changing the settings for your LPR camera, validate your configuration (see ) to check if the system recognizes license plates as well as expected.

## Country modules tab

A country module is a set of rules that defines which license plates of a certain type and form belong to which country, state, or region.

On this tab, select the country modules that you want to use with a specific LPR camera. The list that you can select from depends on:

- The modules that you have installed (see Install XProtect LPR on page 28)

- Your licenses (see XProtect LPR licenses on page 9)

⚠️ Milestone recommends that you select maximum 5 country modules per camera.

Already licensed modules appear with a check mark in the **Licensed** column. If the country module you are looking for is not on your list, contact your vendor.

LPR camera Information

## Country modules

Search by country module or country code

| Select | Country module | Country code | Licensed |
|--------|----------------|--------------|----------|
| ☐ | Burkina Faso | BF | ☐ |
| ☐ | Burundi | BU | ☐ |
| ☐ | Cameroon | CMR | ☐ |
| ☐ | Canada | CDN | ☐ |
| ☐ | Canada - Alberta | CDN_AB | ☐ |
| ☐ | Canada - British Columbia | CDN_BC | ☐ |
| ☐ | Canada - Manitoba | CDN_MB | ☐ |
| ☐ | Canada - Ontario | CDN_ON | ☐ |
| ☐ | Canada - Quebec | CDN_QC | ☐ |
| ☐ | Chile | RCH | ☐ |
| ☐ | China | CN | ☐ |
| ☐ | Colombia | CO | ☐ |
| ☐ | Congo | CGO | ☐ |
| ☐ | Croatia | HR | ☐ |
| ☐ | Cyprus | CY | ☐ |
| ☐ | Czech Republic | CZ | ☐ |
| ☐ | Dangerous Goods | X_DG | ☐ |
| ☐ | Democratic Republic of Congo | RCB | ☐ |
| ☑ | Denmark | DK | ☑ |
| ☐ | Dominican Republic | DOM | ☐ |
| ☐ | Ecuador | EC | ☐ |
| ☐ | Egypt | ET | ☐ |
| ☐ | Estonia | EST | ☐ |
| ☐ | EU | X_EU | ☐ |
| ☑ | EU Generic | EU | ☑ |
| ☐ | Faroe Islands | FO | ☐ |
| ☐ | Finland | FIN | ☐ |
| ☐ | France | F | ☐ |
| ☐ | Generic | X_XX | ☐ |
| ☐ | Generic number reader | X_NR | ☐ |
| ☐ | Georgia | GE | ☐ |

7 free country module license(s) available.

Selected country modules:
Denmark (DK)
EU Generic (EU)

ℹ️ Info    ⚙️ Recognition settings    🖼️ Match lists    🌐 Country modules

| Name | Description |
|---|---|
| **Select** | Click to select or deselect a country module. The list of selected country modules on the right-hand side updates automatically. |
| **Country Module** | Lists the installed country modules. |
| **Country Code** | Letters that identify a country module. |
| **Licensed** | Shows if a country module is already licensed. You can select a licensed country module for as many cameras as you like. |

After changing the settings for your LPR camera, validate your configuration (see Validate configuration on page 44) to check if the system recognizes license plates as well as expected.

## Extend time span for avoiding partial recognitions

If parts of the same license plate are recognized as separate and incomplete plate numbers, ensure no irrelevant moving objects (see Camera angles on page 12) block the view of your LPR camera. If the problem persists, give the system more time to avoid partial recognitions. Your recognitions will be more accurate, but they will all show up delayed.

1. In the **Site Navigation** pane, select **Servers** > **LPR servers** > **LPR cameras**.

2. In the **LPR cameras** pane, find and click the camera to modify.

3. On the **Recognition settings** tab, click **Advanced settings**.

4. In the **Time span for avoiding partial recognitions** field, drag the slider to the right to give the system a maximum of five extra seconds to recognize the most complete license plate numbers and discard the rest.

## Select snapshots

When you configured the LPR initially with the **Add LPR camera** wizard, you also added snapshots (see Snapshots (explained) on page 32). You can always add additional representative snapshots to improve the optimization of the configuration.

1.  Select the relevant camera.

2.  In the **Recognition settings** tab, click **Snapshots**.

3.  Capture snapshots from live video or import them from an external location. Click **Next**.

    The system analyzes the snapshots you have selected for the camera.

4.  On the next page, approve or reject each of the snapshots. If the system could not recognize any license plates, click **Previous** to add new snapshots in a better quality. If the system still cannot provide correct recognitions, you probably need to change your configuration. Check that the camera is mounted and configured correctly (see Preparing cameras for LPR (explained) on page 10).

5.  When you have approved all snapshots, click **Next** and close the wizard.

6.  On the **Recognition settings** tab, click **Validate configuration** (see Validate configuration on page 44).

## Validate configuration

You can validate your current configuration to see if you need to change any settings or provide more snapshots. The validation function informs you about how many license plates your system recognizes, and if they are recognized correctly.

It can help you decide if your confidence level is set correctly and if your system configuration is optimal.

1. Select the relevant camera.

2. From the **Recognition settings** tab, click **Validate configuration**.

   Based on the current settings, the system analyzes the snapshots you have selected for the camera and provides a result summary:

   - **Registration number**: License plate number

   - **Country Code**: Letters that identify a country module

   - **Character height**: 9.5%

   - **Confidence level**: The percentage of confidence with which the license plates have been recognized

   - **Processing time**: The time it took to analyze a snapshot and return a reading measured in ms

   - **License plates style**: A set of characteristics of a license plate. See License plate styles and aliases on page 51

   - **License plates style alias**: A more user friendly name to identify the style. See Aliases (explained) on page 51

   Registration number:
   **3867YA67**
   Country code:
   **F**
   Character height:
   **9.5%**
   Confidence level:
   **88%**
   Processing time:
   **98 ms**
   License plate style
   **F_standard_since_1993_1**
   License plate style alias
   *Not assigned*

3. If the current configuration meets your requirements, click **Close**.

4. If you want to investigate the results further, click **Next**, and you can review the results for each snapshot. This helps you to identify the situations that cause problems.

You can validate the configuration as many times as you like and on any LPR camera and with different settings.

## Auto-configure

Auto-configuration of the LPR camera overwrites any manual changes you have made to the settings. You can select this option if, for example, you have made manual changes that have not given you good recognition results.

1. From the **Recognition settings** tab, click **Auto-configure**.

   A new dialog box appears.

2. Confirm that you want to return to auto-configured settings by clicking **Next**.

   The system optimizes the settings.

3. Click **Close**.

4. If prompted, confirm to save the configuration.

5. Review and validate (see ) the new settings.

# Match lists

## Match lists

A match list is a collection of license plate registration numbers and license plate style aliases (aliases) that you want your system to treat in a special way.

License plate recognitions are compared with these lists and if there is a match, the system triggers an LPR event. LPR events are stored on the event server. Operators can search for and view LPR events on the **LPR** tab in XProtect Smart Client. By default, LPR events are stored for 24 hours.

To change the event retention time:

1. In the Management Client, select **Tools** > **Options** > **Alarms and events**.

2. In **Event retention** > **Retention time (days)**, change the retention time.

For each match list that you create, you can define events and alarms that triggers where there is a match.

**Examples**:

- A company headquarter uses a list of executive management's company car license plates to grant executives access to a separate parking area. When executives' license plates are recognized, the LPR solution triggers an output signal that opens the gate to the parking area.

- A chain of gas stations creates a list of license plates from vehicles that have previously left gas stations without paying for their gas. When such license plates are recognized, LPR triggers output signals that activate an alarm and temporarily block the gas supply to certain gas pumps.

You can also use triggered events to force cameras to record in high quality or similar. You can even use an event to trigger combinations of such actions.

## Unlisted license plates list

Often you trigger an event when a license plate that is included in a match list is recognized, but you can also trigger an event with a license plate which is **not** included in a match list.

**Example**: A private car park uses a list of license plates to grant residents' vehicles access to the car park. If a vehicle with a license plate that is not in the list approaches the car park, the LPR solution triggers an output signal which lights a sign telling the driver to obtain a temporary guest pass from the security office.

To trigger a surveillance system event when a license plate that is **not** on any of your match lists is recognized, use the **Unlisted license plates** list. You select it for a camera like any other list (see Match lists tab on page 39) and set it up like any other list (see Events triggered by LPR on page 55).

## Add new match lists

1. In the **Site Navigation pane**, select **Match lists**, right-click and select **Add New**.

2. In the window that appears, give the list a name and click **OK**.

   The newly created match list now appears in the **Match lists** window and on the **Match lists** tab of every LPR camera.

3. To add columns to the match list, click **Custom field** and specify the columns in the window that opens (see Edit custom fields properties on page 50). You can add a maximum of five (5) columns.

4. To update the match list, use the **Add** or **Delete** buttons (see Add match list items on page 47).

5. Confirm your changes to save.

> 🖉 Instead of defining the match list directly in the Management Client, you can instead import a file (see Import and export match lists on page 48).

> 🖉 You can only edit the properties of custom fields.

## Add match list items

> ✅ Match lists support aliases but not individual license plate styles. If you want to add a license plate style to a match list, first assign an alias to the license plate style. See Group license plate styles into aliases on page 52. Next, add the alias to the match list.

1. In the **Site Navigation pane** > **Servers**, select **Match lists**.

2. Go to the Overview pane. Select the relevant match list.

3. The **Match list information** window opens.

4. To include new rows to your list, click **Add** and fill out the fields.

- Do not include any spaces.

- Always use capital letters.

  **Examples**: *ABC123* (correct), *ABC 123* (incorrect), *abc123* (incorrect)

- You can use wildcards in your match lists by defining plates with a number of ?'s and the letter(s) and/or number(s) which must appear at specific places.

  **Examples**: *?????A, A?????, ???1??, 22??33, A?B?C?* or similar

5. Confirm your changes to save.

## Import and export match lists

> You can only import and export license plate registration numbers. Other vehicle information supported by match lists, for example aliases, cannot be imported or exported.

You can import a .csv or a .txt file with a list of license plate registration numbers that you want to use in a match list. You have the following import options:

- Add license plate registration numbers to the existing match list

- Replace the existing match list

This is useful if, for example, the match lists are managed from a central location. Then all local installations can be updated by distributing a file.

Similarly, you can export the complete list of license plate registration numbers from a match list to an external location.

To import:

1. In the **Site Navigation pane** > **Servers** > **Match lists**, select the relevant match list.

2. Select **Import**.

3. In the dialog box, specify the location of the import file and the import type. Select **Next**.

4. Await the confirmation and select **Close**.

To export:

1. In the **Site Navigation pane** > **Servers** > **Match lists**, select the relevant match list.

2. Select **Export**.

3. In the dialog box, specify the location of the export file and select **Next**.

4. Select **Close**.

5. You can open and edit the exported file in, for example, Microsoft Excel.

Imports of a match list overwrites the current match list

"Exporting only export the registration numbers and not the aliases"

## Match list properties

| Name | Description |
|------|-------------|
| **List name** | Shows the name of the list. If needed, you can change the name. |
| **Custom fields** | Select to specify which license plate entry columns that you or the client user can add additional information to. See Add match list items on page 47. |
| **Search** | Search the match list for any list item. If needed, you can use *?* as a single wildcard |
| **Add** | Select to add a license plate registration number or an alias to the match list.<br><br>When you're adding license plate registration numbers:<br><br>• Do not include any spaces<br><br>• Always use capital letters<br><br>**Examples**: *ABC123* (correct), *ABC 123* (incorrect), *abc123* (incorrect)<br><br>• You can use wildcards in your license plate lists. Do this by defining plates with a number of ?'s and the letter(s) and/or number(s) which must appear at specific places<br><br>**Examples**: *?????A*, *A?????*, *???1??*, *22??33*, *A?B?C?* and similar.<br><br>Some regional areas might have exceptions to these rules. For example, personalized plates with spaces. Plates with two sets of characters which must be recognized separately by an underscore character ( _ ). Or plates from certain regions with letters on a different background color on parts of the license plate.<br><br>**Example**: 06759 ·٦٧٥٩ |
| **Edit** | Make edits to properties of custom fields. |

| Name | Description |
|---|---|
| **Delete** | Click to delete the selected license plate number. |
| **Import** | Click to import license plate registration numbers from any comma-separated file, for example a .txt-file or .csv-file (see Import and export match lists on page 48). |
| **Export** | Click to export the list of license plate registration numbers to a comma-separated file, for example a .txt-file or .csv-file (see Match list properties on page 49). |
| **Rows per page** | Select how many list items to display in one page (one screen). You can choose between 50 and 1000 rows. |
| **Events triggered by list match** | Select which event(s) should be triggered by a list match (see Match list properties on page 49). You can choose between all available types of events defined in your system. |

## Edit custom fields properties

You can add a maximum of five (5) columns to your match lists for additional information. You can define the name and number of columns, and the content of the fields.

XProtect Smart Client users can update the information in the columns but not the columns themselves.

| Name | Description |
|---|---|
| **Add** | Adds a column to the match list. Enter a name for the column. |
| **Edit** | Click to edit the name of the column. |
| **Delete** | Deletes a column. |
| **Up** | Changes the order of the columns. |
| **Down** | Changes the order of the columns. |

# License plate styles and aliases

## License plate styles (explained)

A license plate style is a set of characteristics of a license plate, including the:

- Plate size and shape

- Text format and font

- Colors

- Type of vehicle that the license plate is used on

See a list of all license plate styles supported by XProtect LPR.

You can group license plate styles into aliases. See Aliases (explained) on page 51.

## Aliases (explained)

A license plate style alias (alias) is a group of license plate styles. You can group license plate styles into an alias by creating the alias and assigning the alias to the license plate styles of your choice.

Aliases are optional. Using them is beneficial because:

- Aliases help you categorize license plate styles according to your license plate recognition needs. See Example scenario on page 52

- You specify the name of an alias. License plate styles have long and complex names that might be difficult to work with. Using aliases, you can specify a more descriptive group name

- You can add aliases to match lists. See Add match list items on page 47

- The XProtect Smart Client operator can add aliases to match lists

## Find license plate styles used in your system

Every country module contains license plate styles. When you enable a country module, all the license plate styles that belong to that country module are also enabled.

To see a list of all license plate styles enabled in your system:

1. Select **Site Navigation** > **Servers** > **License plate style aliases** > **Assign aliases**.

2. In the **License plate style** column, see a list of all license plate styles enabled in your system.

> ✅ Match lists support aliases but not individual license plate styles. If you want to add a license plate style to a match list, first assign an alias to the license plate style. See Group license plate styles into aliases on page 52. Next, add the alias to the match list. See Add match list items on page 47.

## Add, edit, delete aliases

1. Select **Site Navigation** > **Servers** > **License plate style aliases** > **Configure aliases**.

2. Select:

   - **Add** to create an alias and specify an alias name

   - **Edit** to rename an alias

   - **Delete** to remove an alias

## Group license plate styles into aliases

To group multiple license plate styles into an alias, you need to assign an alias to the license plate styles.

1. Select **Site Navigation** > **Servers** > **License plate style aliases** > **Assign aliases**.

2. For each license plate style that you want to assign an alias to:

   1. Select the dropdown in the **Alias** column.

   2. Select the alias of your choice.

## Example scenario

In this example, let's create aliases and assign them to license plate styles in the Denmark country module.

To follow along, open your Management Client and have the Denmark country module enabled.

For our license plate recognition needs, we decide to categorize license plate styles in the Denmark country module into the following groups:

- Commercial

- Motorcycle

- Private

- Standard

With the Denmark country module already enabled, let's first create the aliases, and then assign them to license plate styles.

### Create aliases

1. Select **Site Navigation** > **Servers** > **License plate style aliases** > **Configure aliases**.

2. Select **Add** to create an alias.

   Let's create the four aliases:

   - **DK_COMMERCIAL**

   - **DK_MOTORCYCLE**

   - **DK_PRIVATE**

   - **DK_STANDARD**
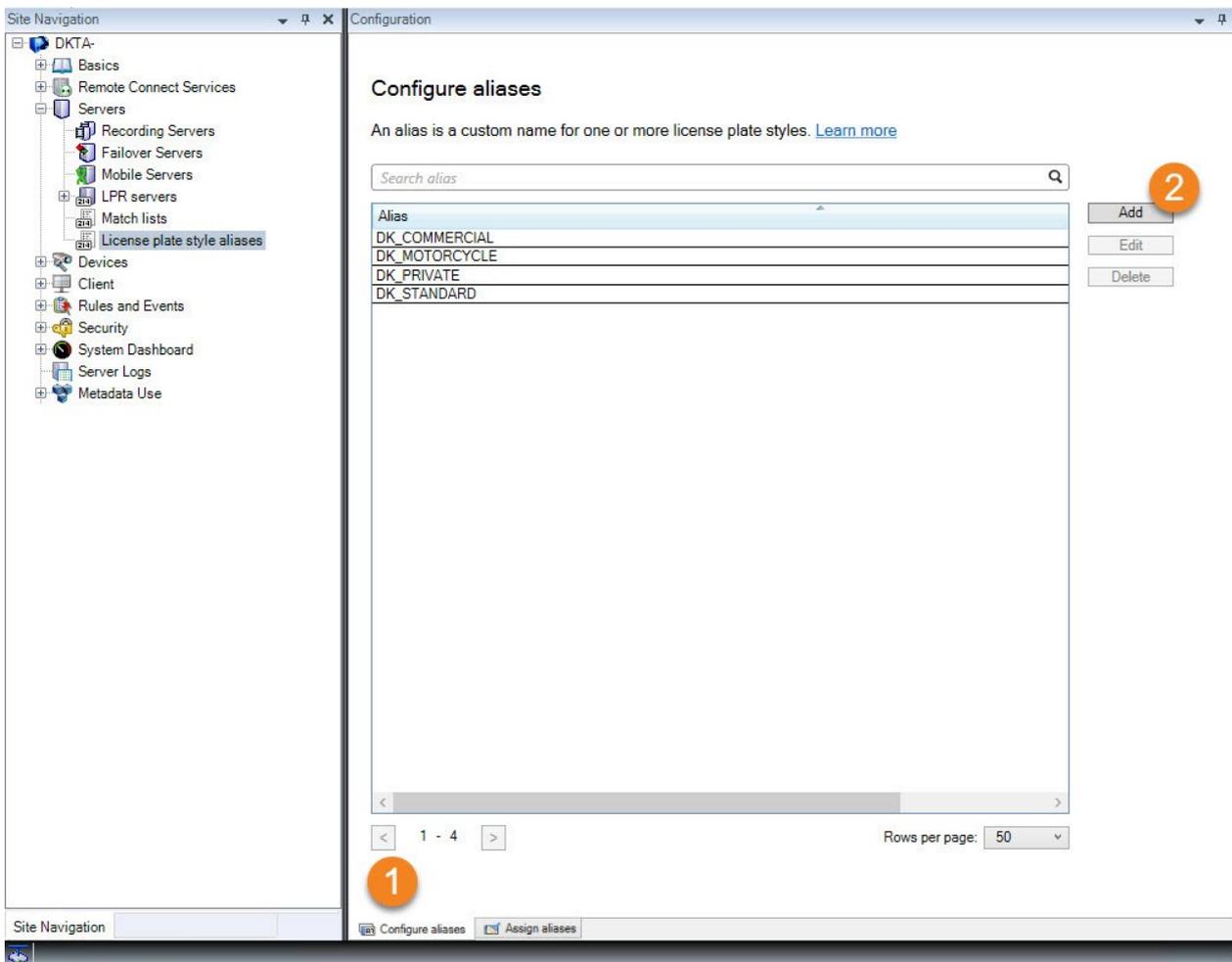


Next, let's group license plate styles into aliases by assigning the new aliases to the license plate styles.

**Assign the aliases to license plate styles**

1. Select **Site Navigation** > **Servers** > **License plate style aliases** > **Assign aliases**.

2. For each license plate style that you want to assign an alias to, select the dropdown in the **Alias** column and select the alias of your choice.

   We assign aliases to license plate styles in the Denmark country module as follows:

| License plate style | Alias |
|---|---|
| • DK_commercial_since_1976<br>• DK_commercial_since_2008<br>• DK_commercial_since_2009<br>• DK_commercial_since_2009_twoline | DK_COMMERCIAL |
| • DK_motorcycle_since_1976 | DK_MOTORCYCLE |
| • DK_private_transport_since_2009<br>• DK_private_transport_since_2009_euroband<br>• DK_private_transport_since_2009_twoline<br>• DK_private_transport_since_2009_twoline_euroband | DK_PRIVATE |
| • DK_standard_since_1976<br>• DK_standard_since_2009<br>• DK_standard_since_2009_euroband<br>• DK_standard_since_2009_twoline<br>• DK_standard_since_2012_holograph | DK_STANDARD |
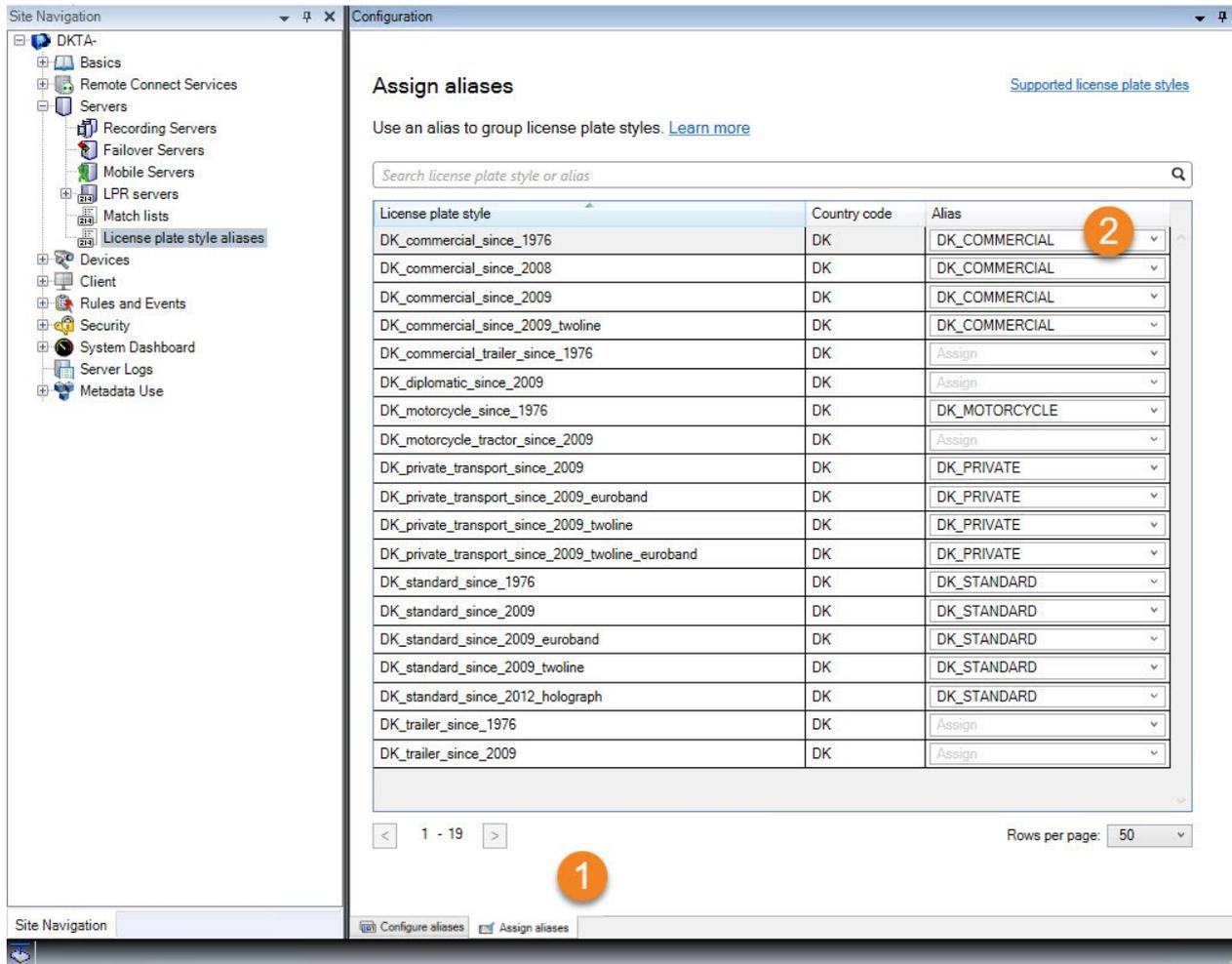
Note that we assigned the **DK_MOTORCYCLE** alias to only one license plate style. We did that because we want to use this specific license plate style on a match list, and match lists support aliases but not individual license plate styles.

In this example, we created aliases and assigned them to license plate styles. A possible next step is to add the aliases to match lists. That way, we can associate different groups of license plate styles with different LPR events. For example, we can open a gate to a vehicle only if the license plate style of the vehicle is part of the **DK_COMMERCIAL** alias. See Match lists on page 46.

# Events triggered by LPR

After you have created match lists (see Add new match lists on page 47), you can associate them with all types of events defined in your system.

The type of events available depends on the configuration of your system. In connection with LPR, events are used to trigger output signals for, for example, raising of parking barrier or making cameras record in high quality. You can also use an event to trigger combinations of such actions. See Match lists on page 46 for more examples.

**Set up system events triggered by list matches**

1. In **Servers** > **Match list**, select the list to which you want to associate an event.

2. In the **Match list information** window, next to the **Events triggered by list match** selection field, click **Select**.

3. In the **Select triggered events** dialog box, select one or more events.

4. If prompted, confirm to save changes.

5. The event is now associated with recognitions on the selected match list.

To trigger a surveillance system event when a license plate that is **not** on a list is recognized, configure the **Unlisted license plates** list.

# Alarms triggered by LPR

You can associate some types of alarms with events from XProtect LPR. Do the following:

1. Create the match list (see Add new match lists on page 47) you want to match license plates against.

2. Add and configure your LPR camera(s) (see Add LPR camera on page 34).

3. In the **Site Navigation pane** > **Alarms**, right-click **Alarm Definitions** and select **Add new** to create a new alarm.

4. The **Alarm definition information** window appears. Select the relevant properties (see Alarm definitions for LPR on page 56).

5. Save your changes.

6. Configure the alarm data settings for LPR (see Alarm data settings for LPR on page 57).

## Alarm definitions for LPR

Except for defining **Triggering events**, the settings for **Alarm definitions** are the same for LPR as for the remaining part of the system.

To define triggering events related to LPR, select the event message to use when the alarm is triggered:

1. In the **Triggering event** field, in the top dropdown list, decide what type of event to use for the alarm. The list offers **Match lists** and **LPR server** events (see Match lists on page 46).

2. In the second dropdown list, select the specific event message to use. If you selected **Match lists** in the dropdown above, select a match list. If you selected **LPR server**, select the relevant LPR server event message:

   - LPR camera connection lost

   - LPR camera running

   - LPR server not responding

   - LPR server responding

## Alarm data settings for LPR

In the Management Client, you must make three specific **Alarm List Configuration** elements available for selection in XProtect Smart Client.

These elements are used for configuring alarm lists in the **Alarm Manager** tab in XProtect Smart Client. The relevant elements are **Object**, **Tag**, and **Type**, which are essential for recognizing license plate numbers (**Object**) and country codes (**Tag**).

Do the following in the Management Client:

1. In the **Site Navigation** > **Alarms**, select **Alarm Data Settings**.

2. On the **Alarm List Configuration** tab, select **Object**, **Tag**, and **Type** and click **>**.
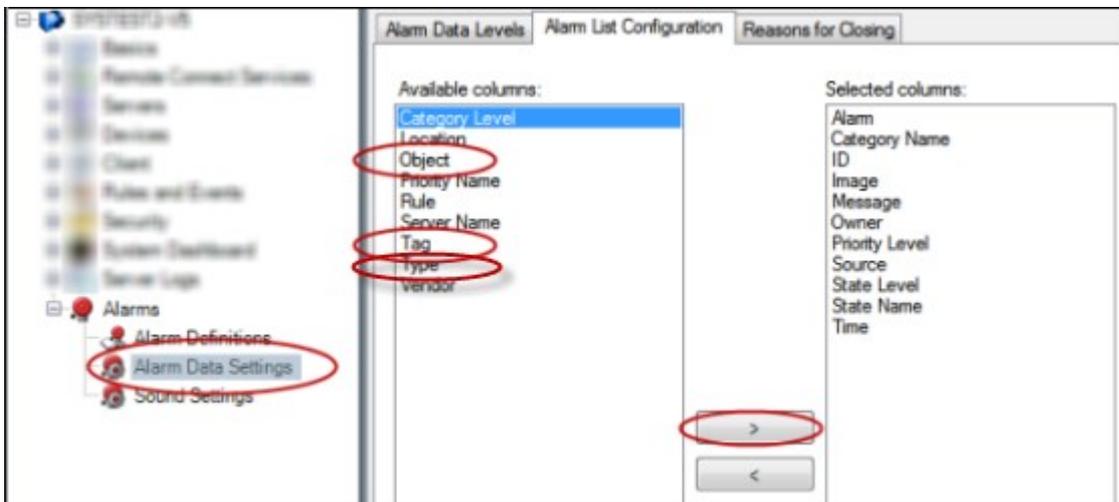


3. Save your changes.

The XProtect Smart Client operator can now enable these LPR-specific elements on the **Alarm Manager** tab.

# Maintenance

## LPR Server Manager (explained)

After installing an LPR server, you can check the status of its services with the XProtect LPR Server Manager. You can, for example, start and stop the LPR Server service, view status messages, and read log files.

- Access LPR server state information via the LPR Server Manager tray icon in the notification area of the **computer running the LPR server**



In the Management Client, you can get a full overview of the status of your LPR servers (see ).

## Start and stop LPR Server service

The LPR Server service starts automatically after installation. If you have stopped the service manually, you can restart it manually.

1. Right-click the LPR Server Manager tray icon in the notification area.

2. From the menu that appears, select **Start LPR Server service**.

3. If needed, select **Stop LPR Server service** to stop the service again.

## Show LPR server status

1. On your LPR server, right-click the LPR Server Manager tray icon in the notification area.

2. From the menu that appears, select **Show LPR server status**.

   If the system is running without problems, the status is: All LPR cameras running.

   Other statuses are:

   - Service not responding

   - Not connected to surveillance system

   - Service not running

   - Event Server not connected

   - Unknown error

   - X of Y LPR cameras running

# Show LPR server log

Log files are a useful tool for monitoring and troubleshooting the status of the LPR Server service. All entries are time-stamped, with the most recent entries at the bottom.

1. In the notification area, right-click the LPR Server Manager icon.

2. From the menu that appears, select **Show LPR server Log File**.

    A log-viewer lists the server activities with time stamps.

# Change LPR server settings

The LPR server must be able to communicate with your management server. To enable this, you specify the IP address or host name of the management server during the installation of the LPR server.

If you need to change the address of the management server, do the following:

1. Stop (see ) the LPR Server service.

2. In the notification area, right-click the LPR Server Manager icon.

3. From the menu that appears, select **Change settings**. The **LPR Server service settings** window appears.

4. Specify the new values and click **OK**.

5. Restart the LPR Server service.

# Upgrade

## Upgrade XProtect LPR

When upgrading, Milestone recommends that you first upgrade the LPR server and then the LPR plug-in.

To upgrade XProtect LPR, follow the same steps as for installation (see ).

## Uninstall XProtect LPR

If you want to remove XProtect LPR from your system, uninstall the two components separately using the regular Windows removal procedure:

- On the computers where the XProtect LPR plug-in is installed, uninstall *Milestone XProtect LPR [version] Plug-in*

- On the computers where the XProtect LPR server is installed, uninstall *Milestone XProtect LPR [version] Server*

[helpfeedback@milestone.dk](mailto:helpfeedback@milestone.dk)

About Milestone

Milestone Systems is a leading provider of open platform video management software; technology that helps the world see how to ensure safety, protect assets and increase business efficiency. Milestone Systems enables an open platform community that drives collaboration and innovation in the development and use of network video technology, with reliable and scalable solutions that are proven in more than 150,000 sites worldwide. Founded in 1998, Milestone Systems is a stand-alone company in the Canon Group. For more information, visit https://www.milestonesys.com/.