

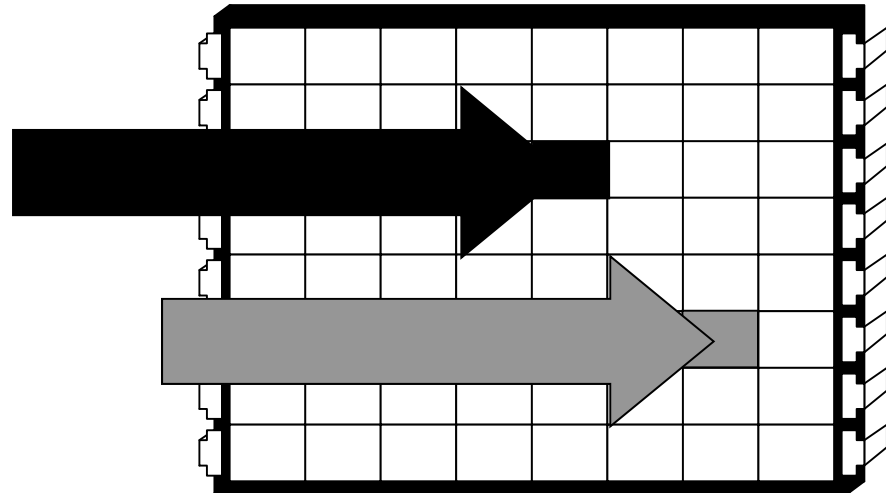
The importance of resolution



www.axis.com

A pixel

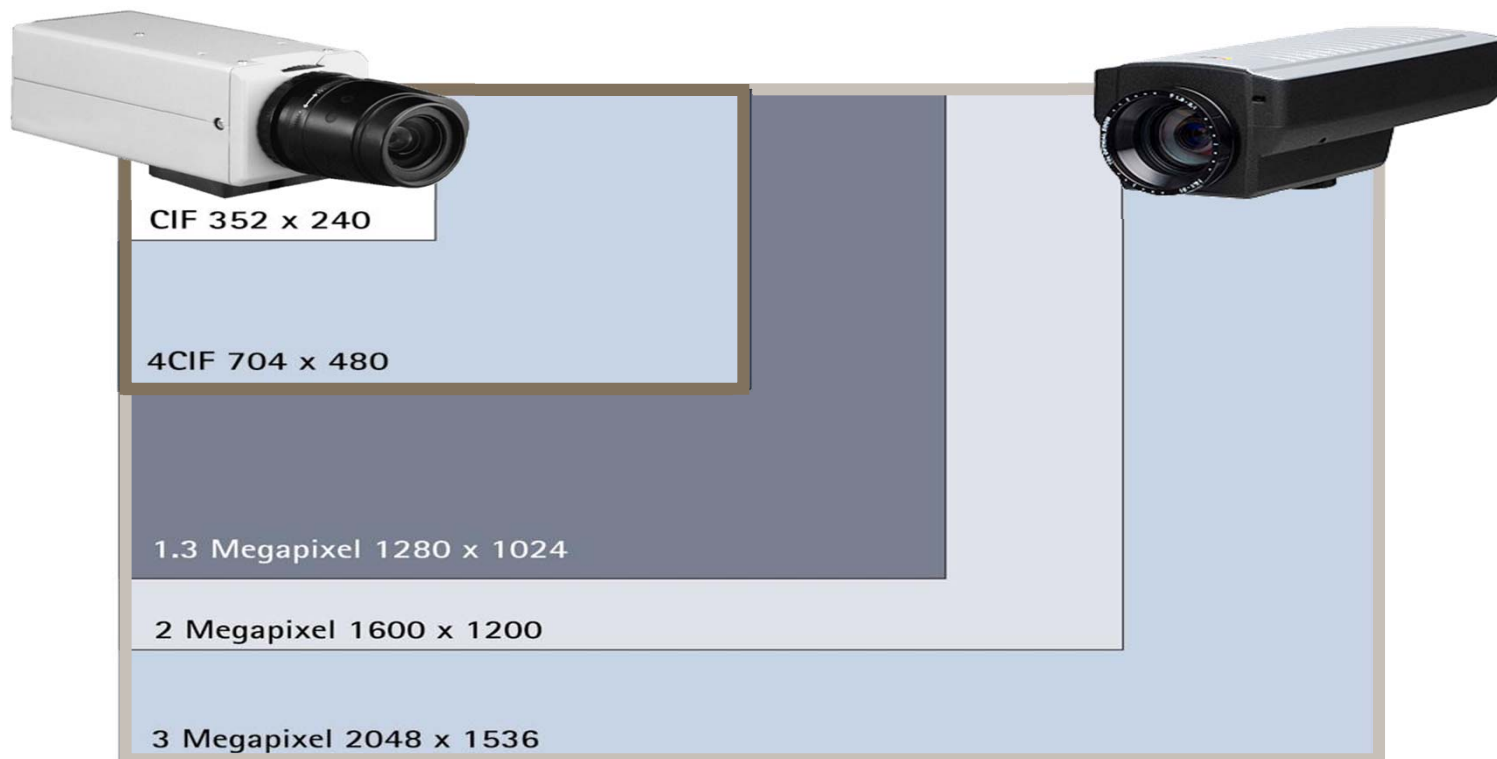
- > The smallest individual unit that makes up the final image
- > 1 million pixels make a Megapixel sensor



What is resolution?



The implication of resolution



Facial recognition



www.axis.com

Why and When

- > When ID is very important
- > Unmanned areas
- > High cost equipment or money is involved
- > Live monitoring for entrance to a building
- > After the fact

Let's do the math!



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The scenario: A Gate Entrance



Steps to know



Performance

Strong identification
Recognition
Detection

Face width

120 pixels
80 pixels
40-70 pixels

License plate

15 pixels /character height
10 pixels

- > Facial recognition simple math – Width in Inches X # of Pixels/ face= Total resolution needed
- > A “normal” face is 6.3 in wide
- > Recommendations for face width for positive ID varies from 60-80 pixels
- > 32 ft of gate entrance requires:

$((32 * 12) * (60 \text{ to } 80)/6.3 \text{ inches per face}) \approx 3660 \text{ to } 4875 \text{ pixels}$

$384'' * 60/6.3 \sim 3660 \text{ pixels}$ (Use 1=P1347 H=2560 + 1=P1344 H=1280 Total = 3840)

$384'' * 80/6.3 \sim 4875 \text{ pixels}$ (Use 2=P1347 H=2560 Total = 5120)

How to use the Pixel counter in the camera



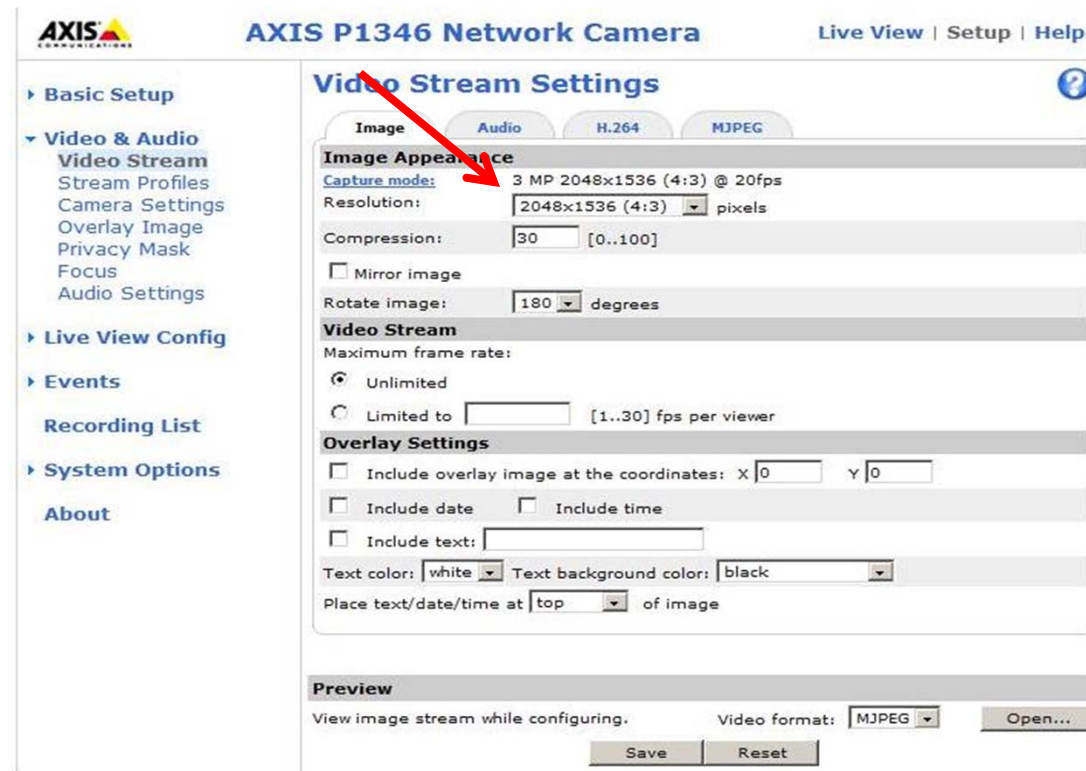
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How to configure pixel counter

1. By default it is 60
2. Adjust it by resizing box



Understand your resolution determines the amount of pixels



AXIS P1346 Network Camera Live View | Setup | Help

Video Stream Settings

Image Appearance

Capture mode: 3 MP 2048x1536 (4:3) @ 20fps

Resolution: 2048x1536 (4:3) pixels

Compression: 30 [0..100]

☐ Mirror image

Rotate image: 180 degrees

Video Stream

Maximum frame rate:

☒ Unlimited

☐ Limited to [] [1..30] fps per viewer

Overlay Settings

☐ Include overlay image at the coordinates: X [0] Y [0]

☐ Include date ☐ Include time

☐ Include text: []

Text color: white Text background color: black

Place text/date/time at top of image

Preview

View image stream while configuring. Video format: MJPEG Open...

Save Reset

320 x 240 - 20 Feet- 13 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 320x240 pixels.



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640 X 480 - 20 Feet- 26 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

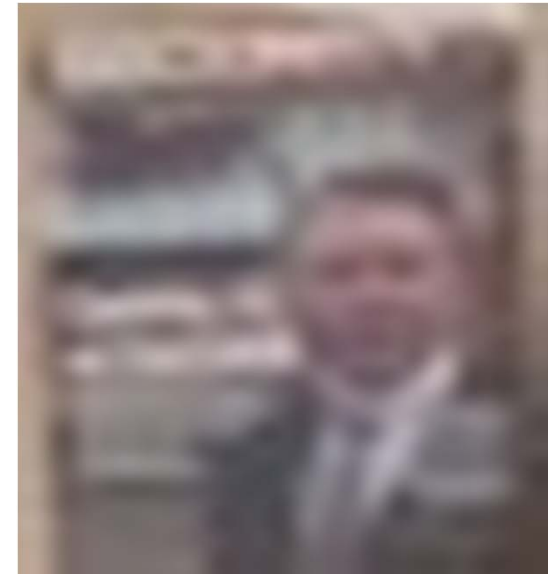
1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 640x480 pixels.



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800 X 600 - 20 Feet- 33 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

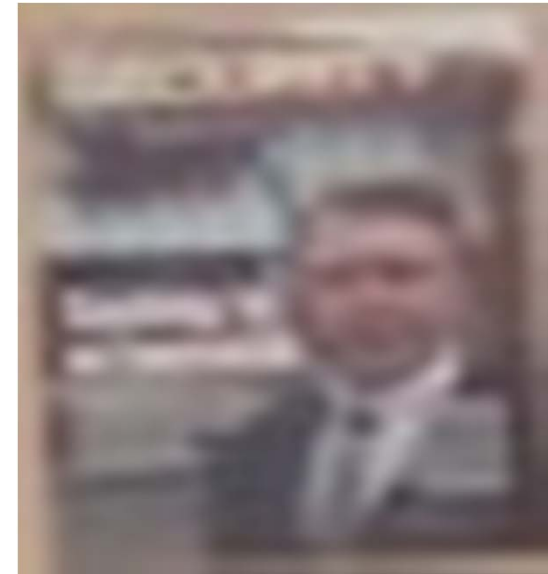
1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 800x600 pixels.



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1280 X 720 - 20 Feet- 54 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 1280x720 pixels.



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2048 X 1536 – 20 Feet- 77 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

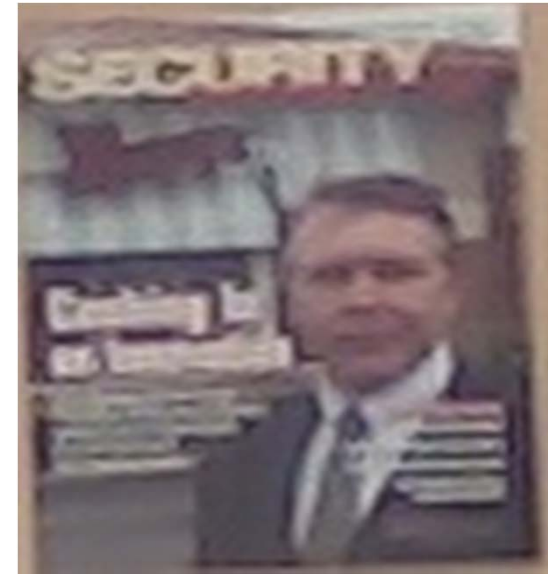
1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 2048x1536 pixels.



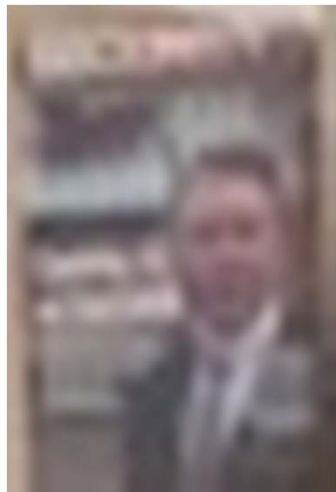
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The higher resolution = more pixels



4mm
13 Pixels
320X240



4mm
26 Pixels
640X480



4mm
33 Pixels
800X600



4mm
54 Pixels
1280X720



4mm
77 pixels
2048X1536

Image Usability

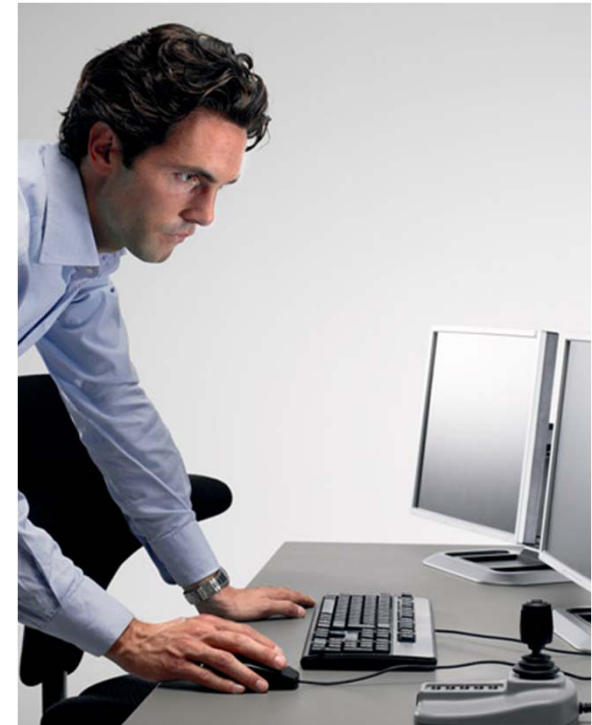


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What is Image Usability?

Image Usability means:

- > **Ensuring** that your video can be used for the purpose that your system is designed for
- > **Focusing** on your specific needs and application
- > **Helping** you by
 - Sharing Axis' experience and competence
 - Delivering the right network video products
 - Providing tools and tutorials
 - Giving you access to Axis' partner network



2048 X 1536 – 20 Feet- 77 Pixels – 4mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

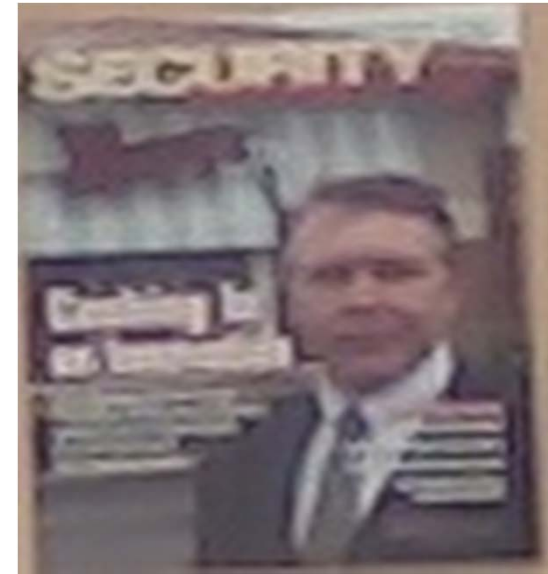
1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 2048x1536 pixels.



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2048 X 1536 - 20 Feet- 176 Pixels – 10mm lens

Focus

Basic

Advanced

Follow these steps to focus the camera:

1.
2. to default back focus position.
3. Zoom and make a rough focus adjustment by moving the pullers on the lens.
4.
5.
6. If desired, the focus may be adjusted manually on the [Advanced](#) tab.



☒ Show pixel counter

Width: Height: pixels

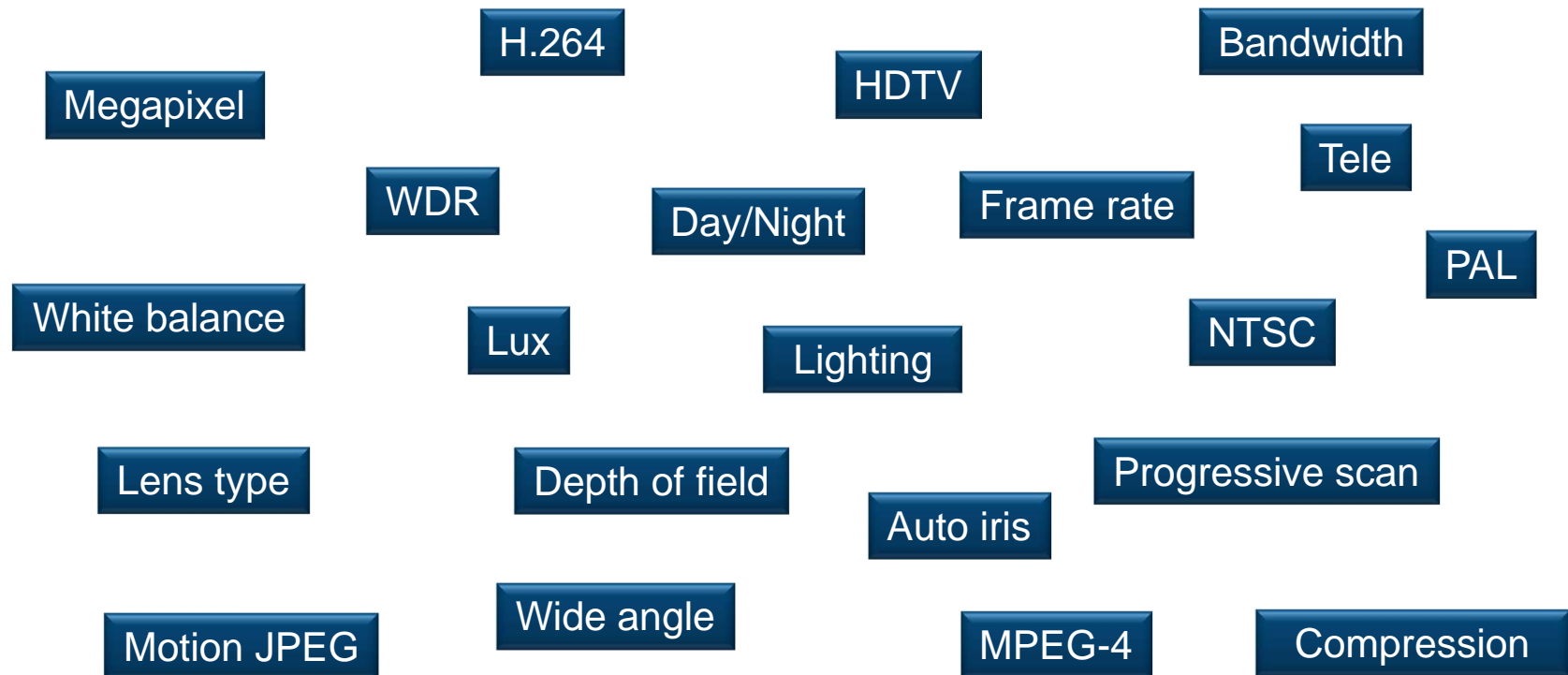
Note: The pixel counter window size is shown relative to the set resolution on the default stream which is currently 2048x1536 pixels.



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Which technology is most important?



Six simple steps to Image Usability

- > Goal definition
- > Scene analysis
- > Camera selection
- > Camera mounting
- > Camera configuration
- > Screen calibration



1 – Goal definition



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Goal definition

You need to decide the purpose:

- > Overview surveillance?
- > High-detail surveillance?
- > Deterrence?
- > Detect or identify people?
- > Read license plates?
- > Live monitoring or recording?

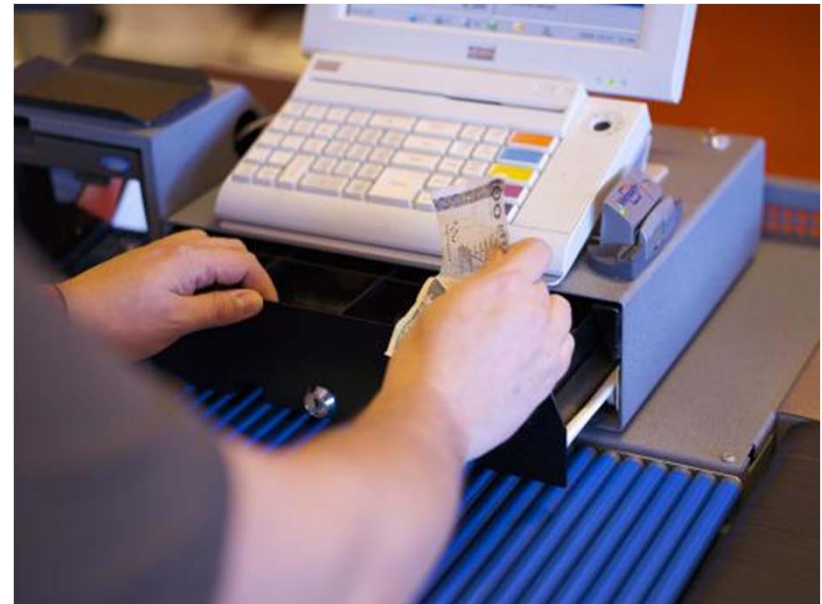


Goal definition – overview or high detail

Is overview enough...



...or high detail required?



Goal definition – deterring or discreet

Is deterrence a factor...

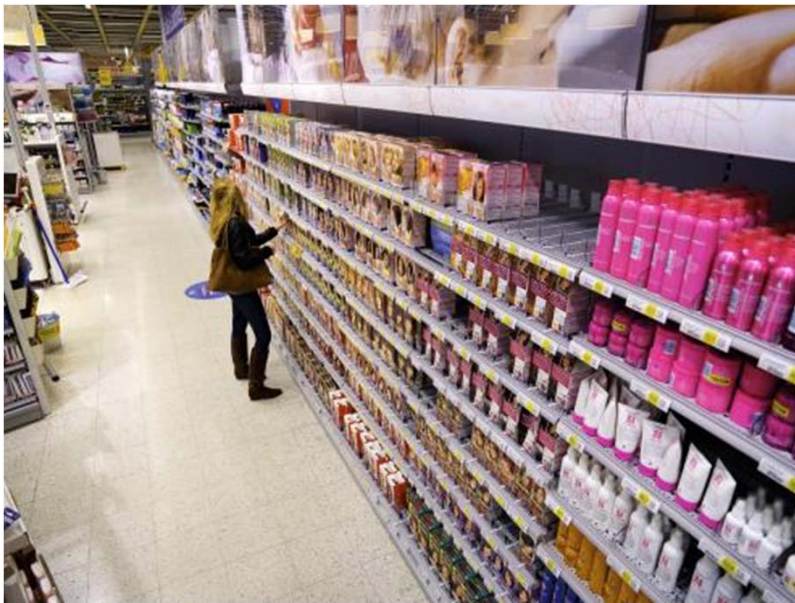


...or is discreet surveillance a priority?

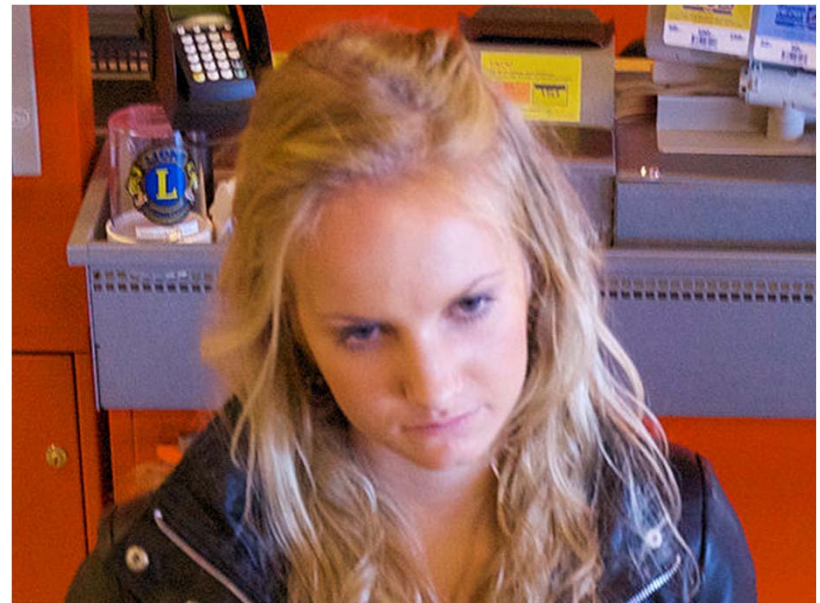


Goal definition – detection or identification

Is it enough to detect people...



...or necessary to identify faces?



2 – Scene analysis



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Scene analysis

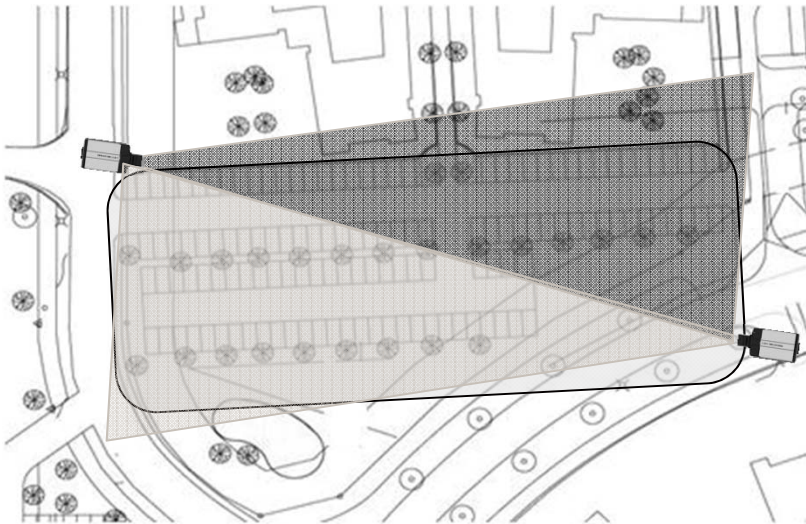
Carefully analyze the scenes to be monitored:

- >Area of coverage?
- >Day and night?
- >Indoor or outdoor?
- >Lighting conditions?
- >Overt or covert surveillance?

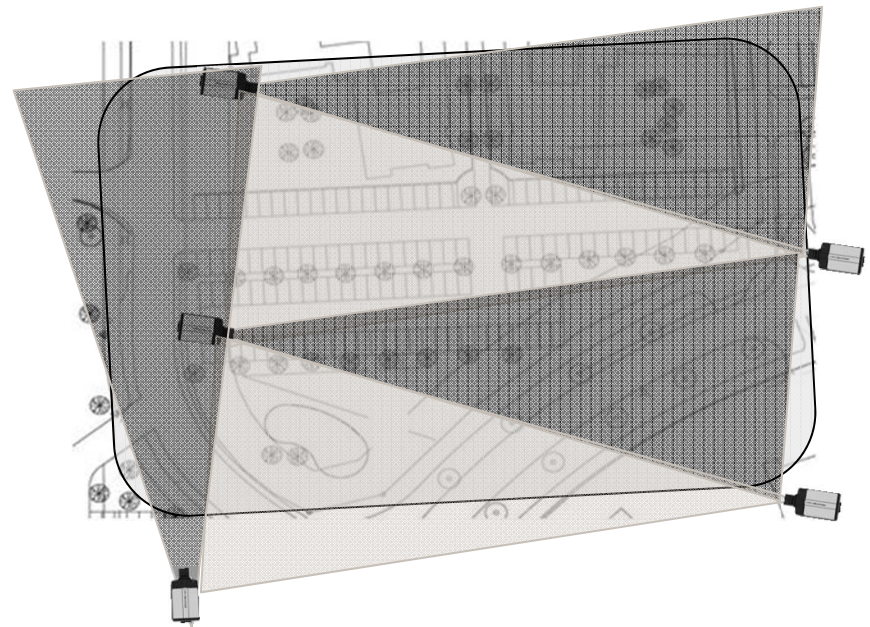


Scene analysis – area coverage

Cover just the parking spaces...



...or adjoining streets, too?



Scene analysis – area coverage

Daytime only...

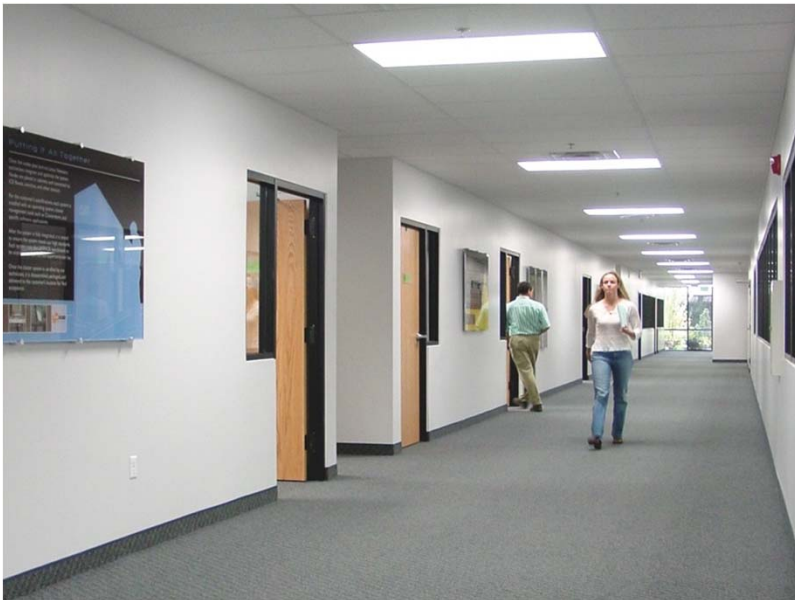


...or 24 hours surveillance?



Scene analysis – indoor or outdoor

Indoor...



...or outdoor?



3 – Camera selection



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Camera selection

Make the right technology choice:

- > VGA, Megapixel or HDTV?
- > WDR (Wide Dynamic Range)?
- > Optics?
- > Fixed or PTZ?
- > Iris control?
- > Light sensitivity?



Camera selection – VGA, megapixel or HDTV

Does VGA best solve the problem...

...or megapixel, or HDTV?



Camera selection – wide dynamic range

Do you need Wide Dynamic Range?



Camera selection – lens choice

Choosing the right lens and optics

Wide



85°

Normal view



35°

Telephoto



10°

4 – Camera mounting

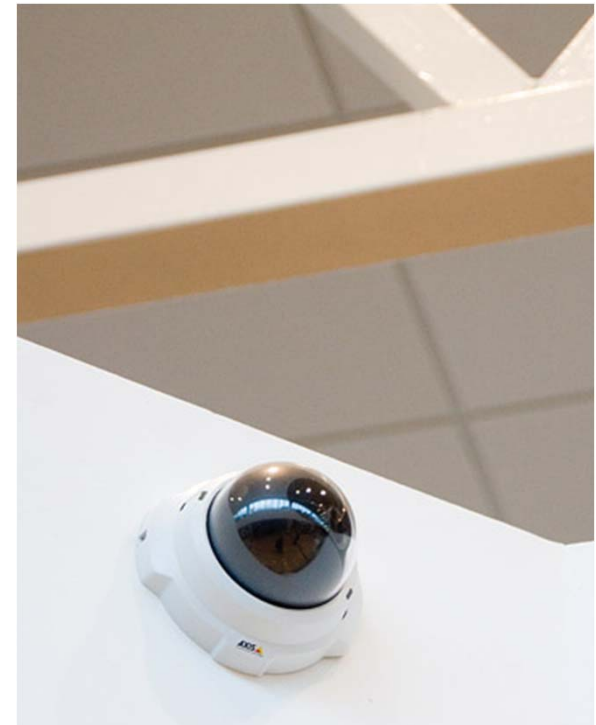


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Camera mounting

Consider how and where to mount the cameras:

- > High up or at face level?
- > Need to add light?
- > Handle backlight and sunlight
- > Legal considerations



Camera mounting – mounting height

High up...



...or face level?



Camera mounting – light

Natural light...



...or added light?



5 – Camera configuration

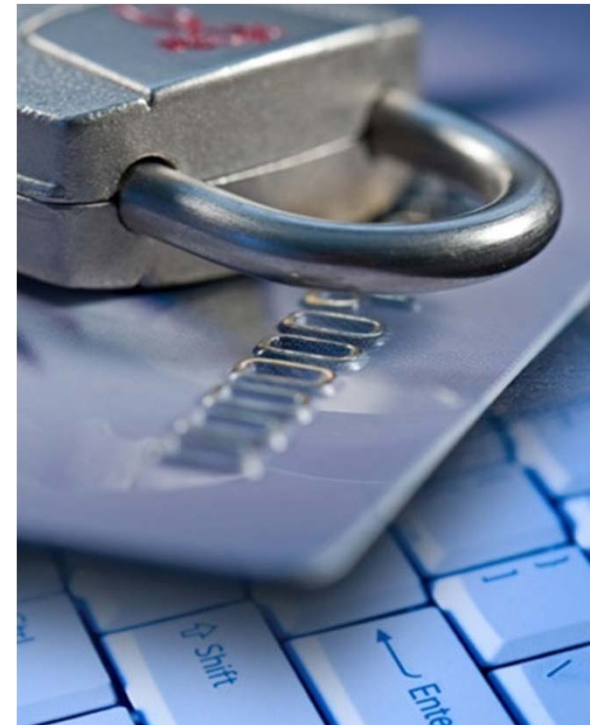


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Camera configuration

Properly adjust all camera settings:

- > Compression
- > White balance
- > Field of view and focus
- > Image exposure
- > Frame rate



Camera configuration – compression

Low image compression...

30 kb file size



...or high image compression?

4 kb file size



Camera configuration – compression

But can you see the difference in these images?

Low image compression...



...or high image compression?

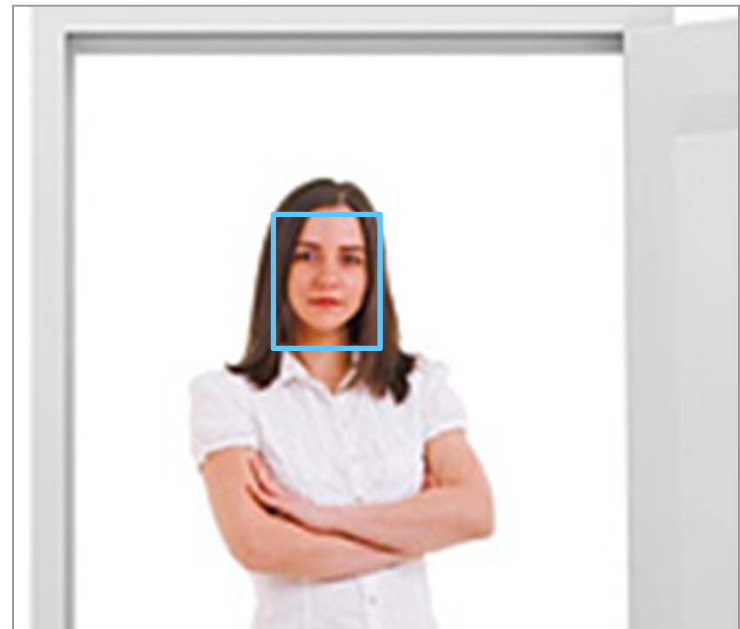


Camera configuration – field of view and focus

Manual effort on most cameras.

**Can be done from the computer on
some Axis cameras:**

- > Remote Zoom
- > Remote Focus
- > Pixel Counter



6 – Screen calibration



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Screen calibration

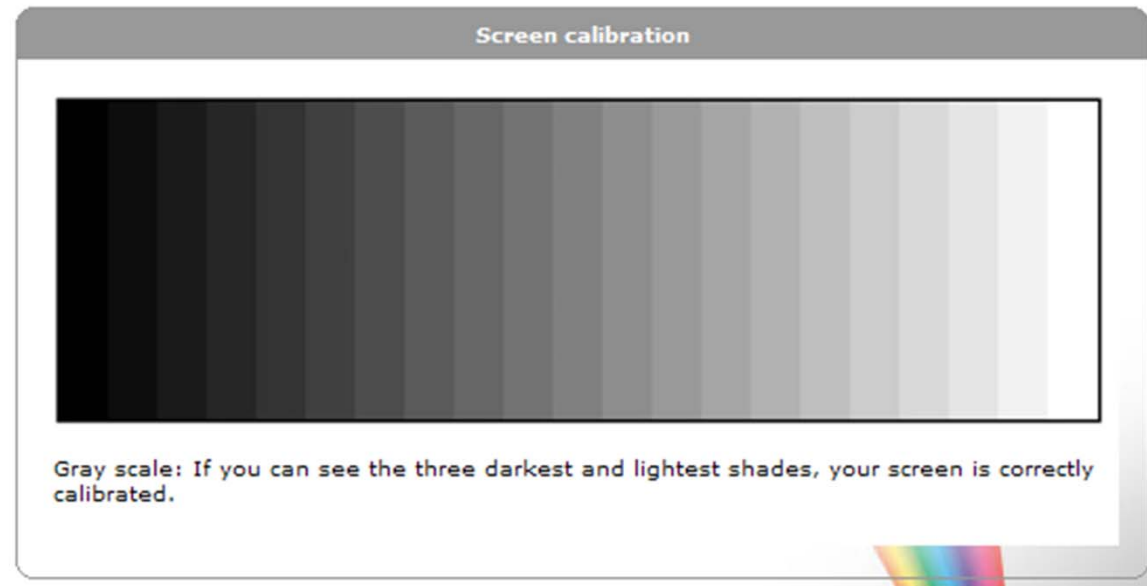
Making sure you're seeing things the right way:

- > Adjust brightness
- > Adjust contrast
- > Adjust gamma
- > Adjust sharpness



Screen calibration – optimize your viewing

From Axis Screen Calibration tool:



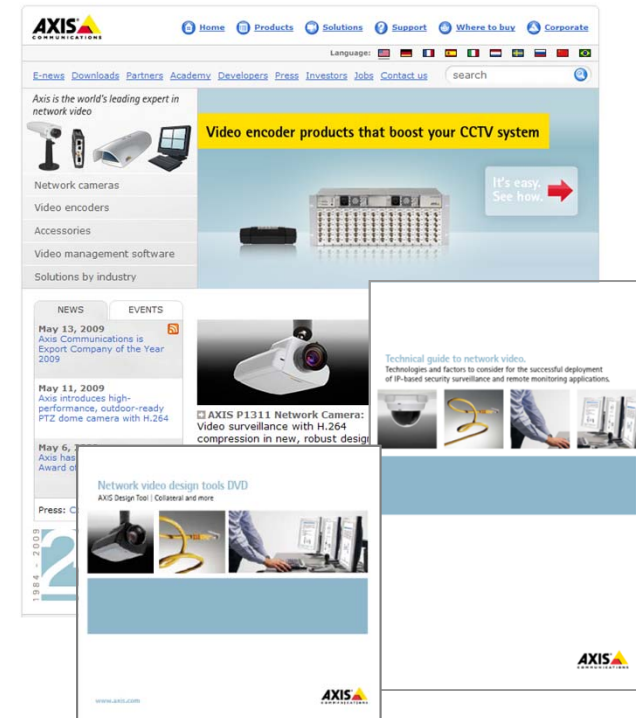
More information – Summary of Axis tools and tutorials



www.axis.com

Three key sources

- > Visit www.axis.com for comprehensive tools, tutorials and information
- > Axis Technical Guide to Network Video
- > AXIS Network Video Design Tools DVD



All online tools in one place

www.axis.com/tools


The screenshot displays the Axis Communications website. At the top, the Axis logo is on the left, and navigation links for Home, Products, Solutions, Support, Where to buy, and Corporate are on the right. A language selection bar is also present. The main content area features a large image of a modern building interior with the text 'Axis network video solutions Tools & Guidelines'. To the left of this image is a sidebar with 'Network video solutions' links (Solutions by industry, Customer stories, Customer references, Demo gallery), 'Related links' (Basics on network video technology, Network video products, Glossary), and a 'Contact us' link. Below the sidebar is an e-newsletter subscription form. To the right of the main image is a vertical menu listing various industries: Banking & finance, City surveillance, Education, Government, Healthcare, Industrial, Retail, and Transportation. Below the main image, there are tabs for Overview, Benefits, IP convergence, and Tools & Guidelines. The 'Tools & Guidelines' tab is active, showing the title 'System design tools & Guidelines' and a 'SHARE' button. The text below states: 'This is where you'll find information about how to successfully deploy or extend your video surveillance system. This section features a variety of tools and guidelines available in different formats, to help you in the design of your network video project.' At the bottom, there is a section for 'Online information' with a link to 'Technical guide to network video'.

www.axis.com



Image Quality Tool

www.axis.com/edu

[Home](#) [Products](#) [Solutions](#) [Support](#) [Where to buy](#) [Corporate](#)







Language:      

Image Quality Tool

- Light**
 - [Light intensity](#)
 - [Color temperature](#)
 - [Light direction](#)
- [Scene](#)
- [Complexity](#)
- [Camera settings](#)
- [Image exposure](#)
- [Resolution](#)
- [Compression](#)
- [Depth of field](#)
- [White balance](#)
- [Axis network video products](#)


☒ [Feedback on this tutorial](#)

Welcome to the IQ Tool for enhanced image quality

The existing light, the scene and the camera settings - these conditions have an effect on the final image. This tutorial will help you understand the different aspects of image quality and what you can do to improve it.

Light

Photographers view light as the main component in creating true representations or artistic images. Light holds many complex components. Light is never the same from one day to another, or for that matter from one minute to the next.



AXIS Design Tool

www.axis.com/products/video/design_tool/calculator.htm

The screenshot displays the AXIS Design Tool interface. At the top, there is a navigation bar with links: Home, User's guide, Clear project, Save project, and Print project. Below this is a table with columns: Name, Model, No. of cams, Bandwidth (View, Rec, Event), and Storage (7 days). The table contains one entry: '1 Default camera' with Model 'AXIS 210', No. of cams '1', Bandwidth '184 Kbit/s, 0 bit/s, 0 bit/s', and Storage '0 byte'. Below the table is a 'Project summary' section showing '184 Kbit/s, 0 bit/s, 0 bit/s' and '0 byte'. The main configuration area is titled 'Camera' and has tabs for 'Camera' and 'Storage'. Under the 'Camera' tab, there are sections for 'Viewing', 'Continuous recording', and 'Event recording'. Each section has a 'Play example' link. The 'Viewing' section has fields for Frame rate (6 fps), Resolution (320x240), Compression type (MPEG-4), Compression (10), and Bandwidth (184 Kbit/s). The 'Continuous recording' section has fields for Record for (24 h), Frame rate (1 fps), Resolution (640x480), Compression type (MotionJPEG), Compression (90), and Bandwidth (111 Kbit/s). The 'Event recording' section has fields for Alarm (20 %), Frame rate (30 fps), Resolution (640x480), Compression type (MotionJPEG), Compression (50), and Bandwidth (5047 Kbit/s). At the bottom of the configuration area are links for 'Remove this camera' and 'Add new camera'. The footer contains the copyright notice '© Axis Communications, All Rights Reserved.' and links for 'Contact', 'Sites', and 'Privacy Statement'.

Name	Model	No. of cams	Bandwidth (View, Rec, Event)	Storage (7 days)
1 Default camera	AXIS 210	1	184 Kbit/s, 0 bit/s, 0 bit/s	0 byte

Project summary: 184 Kbit/s, 0 bit/s, 0 bit/s, 0 byte

Camera [Storage](#)

Camera

Name: [Image scenario](#) [Audio](#) ☐ [Model](#) No. of channels:

☒ **Viewing** [Play example](#)

Frame rate: fps Resolution: Compression type: Compression: Bandwidth: Kbit/s

☐ **Continuous recording** [Play example](#)

Record for: h Frame rate: fps Resolution: Compression type: Compression: Bandwidth: Kbit/s

☐ **Event recording** [Play example](#)

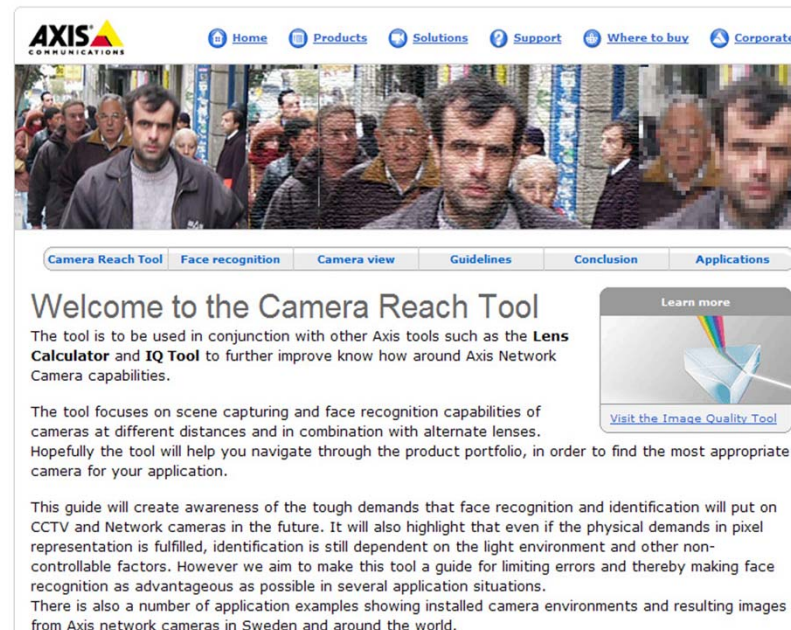
Alarm: % Frame rate: fps Resolution: Compression type: Compression: Bandwidth: Kbit/s

[Remove this camera](#) [Add new camera](#)

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Camera Reach Tool

www.axis.com/tools



The screenshot shows the Axis Communications website for the Camera Reach Tool. At the top is the Axis logo and a navigation bar with links: Home, Products, Solutions, Support, Where to buy, and Corporate. Below the navigation bar is a large image of a crowd of people. Underneath the image is a horizontal menu with tabs: Camera Reach Tool (selected), Face recognition, Camera view, Guidelines, Conclusion, and Applications. The main content area has the heading "Welcome to the Camera Reach Tool" followed by a paragraph explaining the tool's purpose in conjunction with other Axis tools like the Lens Calculator and IQ Tool. To the right of this text is a "Learn more" button with a graphic of a document and a link to "Visit the Image Quality Tool". Below the main text is another paragraph discussing the challenges of face recognition and the tool's role in addressing them, mentioning application examples from Sweden and around the world.

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[Camera Reach Tool](#) [Face recognition](#) [Camera view](#) [Guidelines](#) [Conclusion](#) [Applications](#)

Welcome to the Camera Reach Tool

The tool is to be used in conjunction with other Axis tools such as the **Lens Calculator** and **IQ Tool** to further improve know how around Axis Network Camera capabilities.

The tool focuses on scene capturing and face recognition capabilities of cameras at different distances and in combination with alternate lenses. Hopefully the tool will help you navigate through the product portfolio, in order to find the most appropriate camera for your application.

This guide will create awareness of the tough demands that face recognition and identification will put on CCTV and Network cameras in the future. It will also highlight that even if the physical demands in pixel representation is fulfilled, identification is still dependent on the light environment and other non-controllable factors. However we aim to make this tool a guide for limiting errors and thereby making face recognition as advantageous as possible in several application situations. There is also a number of application examples showing installed camera environments and resulting images from Axis network cameras in Sweden and around the world.

[Learn more](#)

[Visit the Image Quality Tool](#)

www.axis.com

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Other available tools

- > Product comparison guide found at www.axis.com
- > Axis housing configurator
 - www.axis.com/products/video/accessories/configurator/
- > Magic spreadsheet for license plate-, face-, and corridor view
 - www.axis.com/edu/cam_reach/appendix_a.htm
- > AXIS Lens Calculator
 - Used to calculate the distance, coverage (width and height) or focal length
 - www.axis.com/techsup/cam_servers/lens_calculators/

Axis Trainings

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Language:        

Axis Communications' Academy

Number one in network video knowledge

The Axis Communications' Academy was established in 2004 as an investment in our partners, providing a range of educational curricula to boost competence and confidence about Axis products and network video technology. Since its inception, we have trained more than 20,000 individuals worldwide.



▶ Classroom-based training



▶ Web-based training



▶ Webinars



▶ Tutorials & guides

Get the Axis picture. Stay one step ahead.

partner network
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open
megapixel
HDTV
competence
worldwide
network
camera
leader
video
convergence
easy installation
Thank you!
safe
innovation
environment
protect
leader
thermal
global
outdoor
ease of use
H.264
integration
image usability
focus
video encoder
intelligent