

## > HDTV/Megapixel Technology

When every detail matters !

The increased image resolution in HDTV/megapixel network cameras offer a number of benefits compared to other solutions.

# > Quality Comparison - Megapixel/HD vs. Analog

## ■ Megapixel Resolution vs. Analog's Highest Resolution

Don't be fooled by what many competitors claim is high resolution or even high definition CCTV. Based on NTSC/PAL standards the maximum resolution for an analog camera is 0.4 megapixels. Analog high resolution is not very high at all and there is no such thing as a high definition analog camera, no matter what the salesman says.

The following pictures help illustrate this point by comparing a Megapixel IP Camera to a supposed "high resolution" analog camera running at 4CIF. Also, we have zoom in a portion of the area covered by the surveillance cameras, so you can clearly see the difference between the two technologies, in terms of quality

Actual size - Viewed on a 1920x1080 HD screen



5.2 Megapixel camera  
5260 x 2048

Close-up - Viewed on a 1920x1080 screen



Close-up on pixel details without any zoom



# > Quality Comparison - Megapixel/HD vs. Analog

## ■ Analog Resolution

A conventional CCTV camera providing 4CIF resolution offers a resolution of 704x480 pixels (NTSC) or 704x576 pixels (PAL) after the signal has been digitized in a DVR or a video server, which corresponds to a maximum of 400,000 pixels (**0.4 Megapixel**)

In the surveillance industry, some best practices have emerged regarding the number of pixels required for certain applications.

For an overview image, it is generally considered that 20 to 30 pixels are enough to represent one foot of a scene.

For applications that require detailed images, such as face identification, the demands can rise to as much as 150 pixels per foot.

This means, for example, that you want to be able to strongly identify people passing through an area that is seven feet wide and seven feet high, the camera needs to provide a resolution of 1,050x1,050 pixels, which is slightly more than 1 megapixel.

Viewed on a 1920x1080 HD screen



Actual size 704 x 480

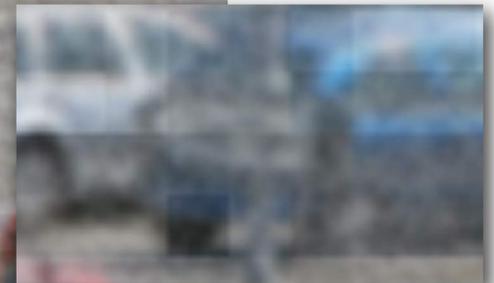


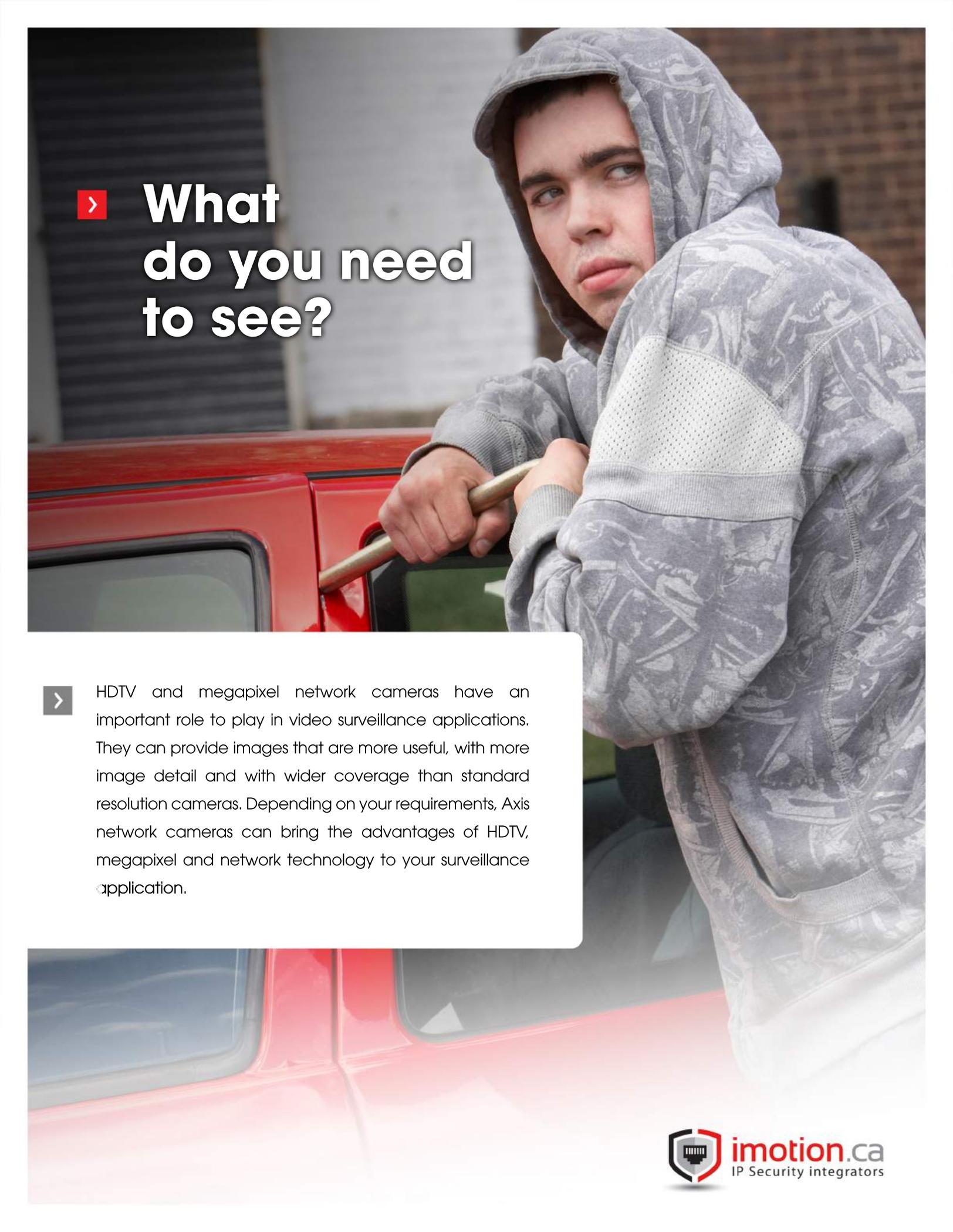
**Analog camera**  
**704 X 480 (4CIF)**

Close-up - Viewed on a 1920x1080 screen



Close-up on pixel details  
without any zoom





## > What do you need to see?

> HDTV and megapixel network cameras have an important role to play in video surveillance applications. They can provide images that are more useful, with more image detail and with wider coverage than standard resolution cameras. Depending on your requirements, Axis network cameras can bring the advantages of HDTV, megapixel and network technology to your surveillance application.

## > What do you need to see? Choosing the right technology

The variation of requirements within video surveillance is enormous. However, it can be boiled down to a choice between two different priorities:

### ▣ General overview

In this case, the aim is to obtain a general overview of a scene. In a shopping mall, for instance, your primary goal of a camera installation may be to watch for the presence of people and view their movements—not the identification of individuals. Or you may want to see whether a parking lot is full or has empty spaces, rather than identify individual cars or read license plates. For overview applications, sufficient resolution and coverage of a scene may be achieved with a single HDTV/megapixel network camera or a number of non-megapixel network cameras.

### ▣ High detail

These are the demanding situations where you need to be able to identify persons or objects in a scene. This could be point-of-sales monitoring where it is necessary to clearly see every item a customer is purchasing, or situations where you need to be able to identify a face. High detail images can be achieved by installing a network camera with a telescopic lens or a lens with zoom capability to enable a closer view of the area of interest, or by placing the camera close to the area to be monitored. Using a HDTV or megapixel network camera in all such cases will provide even higher resolution images with more details than a non-megapixel network camera.



**The increased image resolution in HDTV/megapixel network cameras offer a number of benefits compared to other solutions.**



> With a HDTV or megapixel network camera, the resolution is at least three times better than an analog CCTV camera. It boils down to a simple truth: HDTV and megapixel means higher resolution. Higher resolution means more detail. More detail means better possibilities for identification. In addition, a true HDTV network camera provides full frame rate and extended color fidelity, for an even better viewing experience.

## > Less cameras for equal coverage

### ▶ Optimize your surveillance system at lower cost

Another argument in favor of HDTV and megapixel network cameras is that they can cover larger scenes than non-megapixel network cameras at a given number of pixels per area. For example, if four non-megapixel network cameras provide good coverage of your monitored scene, one 2.0 megapixel network camera will cover an even larger area, with no loss of image resolution.



### ▶ Different aspect ratios for more efficient surveillance

Network video enables images to be delivered in different aspect ratios, which is especially advantageous in combination with the high resolution that megapixel network cameras offer. In a conventional TV monitor, an aspect ratio of 4:3 is provided. Network video can offer the same ratio, in addition to others, such as 16:9. For HDTV network cameras specifically, to comply with the SMPTE (Society of Motion Picture and Television Engineers) HDTV standards, the cameras are required to deliver 16:9 aspect ratio in full frame rate 30/25. The advantage of a 16:9 aspect ratio is that unimportant details, usually located in the upper and lower part of a conventional-sized image, are not present and do not take up bandwidth and storage space.

**Different industry segments put different requirements on video surveillance solutions, but one shared challenge is getting enough image quality to ensure reliable identification of people and objects. HDTV and megapixel network cameras are used in a number of key industry segments to solve this challenge, including:**

#### Retail

In retail, theft and shrinkage can be drastically reduced through effective video surveillance. HDTV and megapixel network cameras have an important role to play, for example by giving an overview of shops and stores, without any blind spots.

#### City surveillance

HDTV and megapixel network cameras are typically used in city surveillance situations to provide high-resolution video streams from locations where there is a need to be able to clearly identify people and objects, or get a larger overview, either while viewing live or recorded video.

#### High security premises

Casinos and airports, together with passport controls, banks and similar high security premises, are areas where the requirements on the surveillance cameras often include high image quality and detail as well as full frame rate, making HDTV network cameras the natural choice.

#### Transportation

Security and safety for both passengers and staff are highly prioritized issues for public transportation authorities around the world. HDTV and megapixel cameras at stations, terminals and airports as well as onboard buses and trains, provide valid evidence in the event of criminal incidents, vandalism and insurance claims.

# > Megapixel Resolution

## Understanding the potential

### > Millions of pixels

A network camera that offers megapixel resolution uses a megapixel sensor to deliver an image that contains one million or more pixels. The more pixels a sensor has, the greater the potential it has for capturing finer details and for producing a higher quality image. Megapixel network cameras can be used to allow users to see more details (ideal for identification of people and objects) or to view a larger area of a scene. This benefit is an important consideration in video surveillance applications.

Display format	Number of pixels	Pixels
<b>SXGA</b>	<b>1.3 Megapixels</b>	<b>1280x1024</b>
<b>SXGA+ (EXGA)</b>	<b>1.4 Megapixels</b>	<b>1400x1050</b>
<b>UXGA</b>	<b>1.9 Megapixels</b>	<b>1600x1200</b>
<b>WUXGA</b>	<b>2.3 Megapixels</b>	<b>1920x1200</b>
<b>QXGA</b>	<b>3.1 Megapixels</b>	<b>2048x1536</b>
<b>WQXGA</b>	<b>4.1 Megapixels</b>	<b>2560x1600</b>
<b>QSXGA</b>	<b>5.2 Megapixels</b>	<b>2560x2048</b>

Megapixel resolution is one area in which network cameras excel over analog cameras. The maximum resolution a conventional analog camera can provide after the video signal has been digitized in a digital video recorder or a video encoder is D1, which is 720x480 pixels (NTSC) or 720x576 pixels (PAL). The D1 resolution corresponds to a maximum of 414,720 pixels or 0.4 megapixel. By comparison, a common megapixel format of 1280x1024 pixels gives a 1.3-megapixel resolution. This is more than 3 times the resolution that can be provided by analog CCTV cameras. Network cameras with 2-megapixel and 3-megapixel resolutions are also available, and even higher resolutions are expected in the future.

Megapixel resolution also provides a greater degree of flexibility in terms of being able to provide images with different aspect ratios. (Aspect ratio is the ratio of the width of an image to its height.) A conventional TV monitor displays an image with an aspect ratio of 4:3. Axis megapixel network cameras can offer the same ratio, in addition to others, such as 16:9. The advantage of a 16:9 aspect ratio is that unimportant details, usually located in the upper and lower part of a conventional-sized image, are not present and therefore, bandwidth and storage requirements can be reduced.



### > HDTV resolutions

HDTV provides up to five times higher resolution than standard analog TV. HDTV also has better color fidelity and a 16:9 format. Defined by SMPTE (Society of Motion Picture and Television Engineers), the two most important HDTV standards are SMPTE 296M and SMPTE 274M.





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