



Why are so many end users switching to megapixel technology? The main reason is price. That probably sounds confusing since the conventional “wisdom” is that a reliable, industrial quality megapixel network camera is three or even four times more expensive than comparable low resolution (4CIF) cameras. How can the megapixel camera be cheaper?

### Video Surveillance Goals

Before we take up price, let’s first discuss why an end user would even consider megapixel? This is the most important question because in some instances megapixel cameras may not be appropriate. Before you look at any camera or NVR/DVR combination you have to initially define the goals for your video system. For simplicity, we narrow the security goals down to three categories:

1. **General Surveillance.** These are applications; often live viewing, where you don’t need detail on recorded video. For instance, you may be watching a road and looking for traffic jams but do not need to read license plates. Or you may be looking to see what a crowd is doing but do not need to recognize faces. You simply want to detect when someone is in a restricted area so you can respond immediately.
2. **Forensic.** These are applications where you need to see, record, and recognize images like license plates and faces, so you can go back “after the fact” and determine exactly what happened.
3. **High Detail.** Applications where you need to read a license plate but also read the model of the car. In a retail or banking context, you need to clearly see the customer’s and employee’s faces as well as identify the currency in their hands.

By assigning a category to your application you are, in fact, defining the resolution requirements. With older surveillance technology, resolution was defined by Total Video Lines (TVL). Over the last few years the market has evolved to defining resolution by the total number of pixels. This is more objective when comparing products that have different resolutions. So, when an image is 640 x 480, that is actually 640 (horizontal or columns) pixels x 480 (vertical or rows) pixels, for a total of 307,200 pixels, or approximately 0.31 of a megapixel (million pixels).

But resolution can only be defined by pixel if you determine how wide an area those pixels will be covering. How do we determine that? It’s all about pixels-per-foot.

### Coverage Defined by Pixels-per-foot

For **General surveillance** applications, you need approximately 20 pixels/ft. Forensic applications require about 40 pixels/ft. and **High Detail** applications demand at least 80 pixels/ft.

Once you have defined the type of application you have, and you know how wide an area you have to cover, you can figure out if megapixel is right for you. An example will make this much clearer. Let’s say you want to cover a parking lot with **forensic** detail and the lot is 100 ft. wide. For simplicity, we will only discuss here the width (horizontal field of view). For a true analysis, you need to factor in the width and depth.

100 ft. x 40 pixels/ft. = 4,000 pixels, which is what you will need to cover that 100’ area and recognize license plates and facial detail. Once you have this, the rest is easy.

The next step is to determine what resolution cameras you want to use. You determine this by dividing the number of pixels you need to cover the area (in our case 4,000) by the number of horizontal (columns) of pixels provided by your camera.

- If you use 320H x 240V resolution cameras (0.07 mpix) you will need  $4,000/320 = 13$  cameras (actually  $12 \frac{1}{2}$  but I couldn’t find any available  $\frac{1}{2}$  cameras).
- At 640 x 480, (0.31 mpix) you need  $4,000/640 = 6 \frac{1}{4}$  so at least 7 cameras.
- For 1280 x 1024 (1.3 mpix) it’s  $3 \frac{1}{4}$ , so 4 cameras will surely cover the area.
- At 2048 x 1536 (3 mpix) 2 cameras will do the job.

## Now Let's Talk about Price

Let's compare a non-megapixel installation for the parking lot with our highest level megapixel cameras in this example. If we look online, a high quality camera made by an established manufacturer that delivers a 640 x 480 image has an MSRP of about \$350. A high quality camera made by an established manufacturer that can deliver a 2048 x 1536 image has an MSRP of about \$1249. A high quality outdoor heater/blower housing has an MSRP of \$225 and 100' of Cat 5 cable can be purchased for \$20 (coax is more expensive). Let's include \$100/unit of labor to install a camera and do the math:

Item	Price	Quantity	Total
640 x 480 camera	\$350	7	\$2450.00
Housing	\$225	7	\$1575.00
Cable	\$20	7	\$140.00
Labor	\$100	7	\$700.00
		Total	\$4865.00

Item	Price	Quantity	Total
2048 x 1536 camera	\$1249	2	\$2498.00
Housing	\$225	2	\$450.00
Cable	\$20	2	\$40.00
Labor	\$100	2	\$200.00
		Total	\$3188.00

Obviously, this is a rather simple model; however, it clearly demonstrates an important fact: if you have a wide area to cover, megapixel is cheaper. Before you reject this analysis because we left out storage, be assured we will address that in an upcoming article.

As a preview, consider that while a megapixel image is certainly larger than a 640 x 480 image, with the smart camera tools available today it is not as large a difference as you would suspect. In fact, with all things kept the same in terms of compression, two images from a 3 megapixel camera typically take up less storage than seven images from a 640 x 480 camera.

## Closing Note

We intentionally avoided a discussion about compression in this article as there are too many variables to consider. Nevertheless, end-users should BEWARE of companies trying to convince you that they can compress images and not lose image quality. A good practice is to demand that anyone who proposes a system to you submit an actual JPEG image and an 8 x 10 glossy of a moving image captured at your site as part of the bid process. This will help ensure you get what you pay for.