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Surveillance, Security & CCTV:
A Buyer's Guide

SECURITY SURVEILLANCE SYSTEMS

Security surveillance equipment, more commonly referred to as CCTV equipment, is not just for large corporations anymore. Changes in technology and the market have made CCTV more affordable than ever. This guide is a comprehensive overview of the most common options available and how to choose what is best for you. This guide will simplify the available options for CCTV. If you have any questions or need further assistance, you can visit www.vonnic.com for an online chat session with a knowledgeable staff member or call toll free **877-538-8685** to speak with a representative in person.

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Cameras

There are a variety of security cameras available on the market today. They vary with technology, style, and features. Lower priced CCTV cameras often use a CMOS (Complementary Metal Oxide Semiconductor) chip whereas higher quality cameras use CCD (Charge Couple Device) chips. Cameras using CMOS technology have less light sensitivity and overall produce a much poorer image compared to cameras using CCD technology. To distinguish between CCD chips manufacturers refer to the size of the chip. You will generally see these noted as 1/4" or 1/3" and sometimes 1/2". Typically a larger chip will produce a higher quality image. However, as technology is evolving, smaller, more affordable chips are being manufactured that produce high image quality.

The style of a camera is refers to the shape and mounting options of a CCTV camera. The most common camera styles are dome, bullet, box, PTZ, and covert.

⇒   Dome cameras are becoming increasingly popular due to their ability to blend in with their surroundings. These cameras are used in residential applications as well as public places such as convenience stores, offices, and lobbies. Though they can be mounted to a wall, they are usually mounted on the ceiling.
⇒   Bullet cameras are encased in cylindrical usually weather resistant housings. Their size, cost and integrated design make them a great choice for home and outdoor installations.
⇒   Box cameras can be used with or without a housing. In most instances, they are used with a housing and bracket unit for outdoor areas such as parking lots and entry gates. Lenses are purchased separately offering greater flexibility.
⇒   PTZ cameras are more expensive but offer the operator more control with remote pan/tilt/zoom. These cameras are used primarily when an operator is actively monitoring an area and needs to manipulate the camera. They are popular in department stores, casinos and government buildings.
⇒   Covert or Spy cameras are designed for discreet installations. They are commonly referred to as a nanny cam. Used frequently by private investigators, they effectively capture video without others being aware.

Camera Specifications

One of the most common differences between cameras is the resolution offered. Camera resolution is measured by the number of horizontal lines the camera chip produces. It is referred to as TV lines or TVL. The more lines of resolution, the higher the image quality. Standard quality is from 380TVL to 420TVL. High quality is from 420TVL to 480TVL. Very high quality is anything above 480TVL.

Cameras are available with a wide range of features such as infrared technology, weatherproof housing, vandal proof housing, and various mounting options.

Camera Specifications continued

Lux is the SI unit of luminous emittance used in photometry as a measure of the apparent intensity of light hitting or passing through a surface. IR cameras have a 0 lux rating as they illuminate in total darkness. Some cameras are known as Day/Night and have very low lux ratings indicating it needs only a small amount of light to capture images in darkness. The chart below is an example of how much light is produced from certain sources measured in lux. If a camera has a lux rating of 0.1 and gets light equivalent to that of a full moon, it will be able to produce an image.

Lux Light Level Chart

	Full Sunlight	50,000 lux		Streetlight	5 lux
	Overcast Sky	5,000 lux		Security Lighting	2 lux
	Office Lighting	500 lux		Clear Full Moon	0.1 lux
	Hallway / Emergency Lighting	50 lux		Moonlit Cloudy Night	0.01 lux
	Sunset	10 lux		Moonless Starry Night	0.001 lux

Infrared technology (IR) refers to the cameras ability to capture images in total darkness. Cameras featuring IR product color images during daylight and switch to black and white at night. When choosing this feature, you will want an accurate measure of the distance you need illuminated at night. Some cameras are equipped with more IR lights than others and therefore are capable of producing longer range images at night.

Daytime 200 lux   *Day/Night 0.1 lux*   *Infrared 0 lux*

Camera Specifications continued

The IP Code or International Protection rating classifies the degrees of protection provided against the intrusion of solid objects, dust, and water in electrical enclosures. The first number you see in an IP rating indicates the effectiveness against intrusion from foreign objects and dust. The second number indicates its effectiveness to protect from the ingress of water. The scale goes from 0-6 for each digit. If you are planning to install outdoor cameras, you will want to use those with an IP 66 rating. This indicates the camera is weatherproof and is safe for outdoor installations.

Vandal proof cameras are those that are tamper resistant. They are enclosed in aluminum or special polymer housings that provide protection in locations such as convenience stores where the camera could be tampered with or hit with an object.

Mounting options are available if standard mounting does not suit your needs. Many brackets are available including pole mount, ceiling mount and corner mount brackets. Having these options increases flexibility when configuring your field of view coverage.

Lenses

A lens is an optical device which transmits and refracts light. When choosing the proper CCTV camera lens, you must consider the following:

⇒ **Varifocal or Fixed** are the two basic types of lenses. Varifocal lenses are adjustable whereas fixed lenses are not. Varifocal lenses are more expensive but are ideal in places where the focal point may change or vary. Fixed lenses typically come as a 3.6mm or 4mm an accommodate most scenarios.

Lenses continued

⇒ **Focal Length** is measured in mm. In general, the lower the number, the wider the angle.

   (2.5mm) = a wide angle of view

   (12mm) = a narrow angle of view
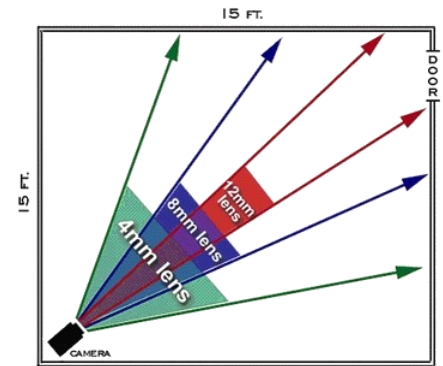
| | 3.6mm | 6mm | 12mm | 60mm |

Field of View Chart

	5ft	10ft	25ft	50ft	100ft	200ft
2.8mm	6.4 x 8.6	12.9 x 17.1	32.1 x 42.9	64.3 x 85.7	128.6 x 171.4	257.2 x 342.8
4.0mm	4.5 x 6.0	9.0 x 12.0	22.5 x 30.0	45.0 x 60.0	90.0 x 120.0	180.0 x 240.0
6.0mm	3.0 x 4.0	6.0 x 8.0	15.0 x 20.0	30.0 x 40.0	60.0 x 80.0	120.0 x 160.0
8.0mm	2.3 x 3.0	4.5 x 6.0	11.3 x 15.0	22.5 x 30.0	45.0 x 60.0	90.0 x 120.0
12.0mm	1.5 x 2.0	3.0 x 4.0	7.5 x 10.0	15.0 x 20.0	30.0 x 40.0	60.0 x 80.0
25.0mm	0.7 x 1.0	1.4 x 1.9	3.6 x 4.8	7.2 x 9.6	14.4 x 19.2	28.9 x 38.4
50.mm	0.4 x 0.5	0.7 x 1.0	1.8 x 2.4	3.6 x 4.8	7.2 x 9.6	14.4 x 19.2
75mm	0.2 x 0.3	0.5 x 0.6	1.2 x 1.6	2.4 x 3.2	4.8 x 6.4	9.6 x 12.8

If you know the distance from where your camera will be mounted to the area you want to monitor, you can better determine what lens you need. If you want to monitor an area 30ft by 40ft and it is 50ft away, using the chart above, you can determine you will need a 6.0mm lens.

⇒ **Manual or Auto Iris** in a camera is similar to that in the human eye. It controls the amount light coming through the lens. It opens and closes as needed to regulate brightness for optimal image clarity. A manual iris has to be set manually at the time of installation. This type of lens is more suited for indoor areas with a constant light source such as shopping centers, offices, and schools. Auto iris lenses are used in areas where the light is constantly changing. These are more commonly used in parking lots and entry ways.

Digital Video Recorders

A digital video recorder (DVR) is the central component in any CCTV system. It is necessary to record the video from any camera. There are two main types, standalone DVRs and PC based DVRs. Standalone DVRs have been the most widely used but PC based DVRs are becoming increasingly more popular with their upgrade flexibility and decreasing costs.

Standalone DVRs

Standalone DVRs are machines are based on Linux, Unix or other proprietary operating system. Designed for a single application, they are simple to use and offer many features. They are commonly available in 4 channel, 8 channel and 16 channel and typically include a central management software (CMS) for remote viewing, PTZ control, live and recording playback options and motion detection. All Vonnic brand DVRs include remote software though some other entry level DVRs may not.

Standalone DVR Benefits:

- High Resolution Recordings (720x480)
- Feature rich, user friendly interface
- Very stable and low maintenance
- Easy network integration
- Low cost

Limitations:

- Proprietary OS decreases flexibility with upgrades and storage capacity.

PC Based DVRs

A PC based DVR is a windows based computer that includes a 4,8,12,16 or 32 channel DVR card. Most DVR cards feature CMS software that offers significantly more options and customizations than the Standalone DVRs. Initial setup of a PC based DVR is more expensive, but you do have increased flexibility when adding cameras and storage.

PC Based DVR Benefits:

- High Resolution Recordings (720x480)
- Upgrade flexibility
- Feature rich, user friendly interface
- Storage capacity
- Easy network integration

Limitations:

- Windows based OS increases vulnerability to virus attacks and software crashes.
- Users must have some basic computer knowledge

Video Compression

MPEG4 and H.264 are the most popular video compression choices. The key to video compression is the resolution and the size of the video. High resolution video files are monster size files and video compression for storage and streaming is critical to any video application. H.264 is the preferred compression method because it provides high resolution video quality from the smallest amount of video data required. Smaller files require less bandwidth and storage over previous generations of video codec's. H.264 delivers the same quality as MPEG-2 at a third to half the data rate and up to four times the frame size of MPEG-4 Part 2 at the same data rate.
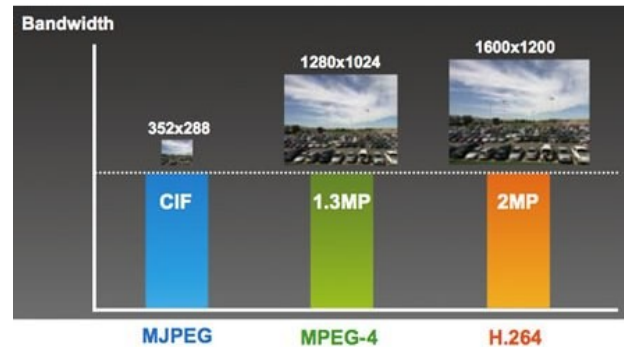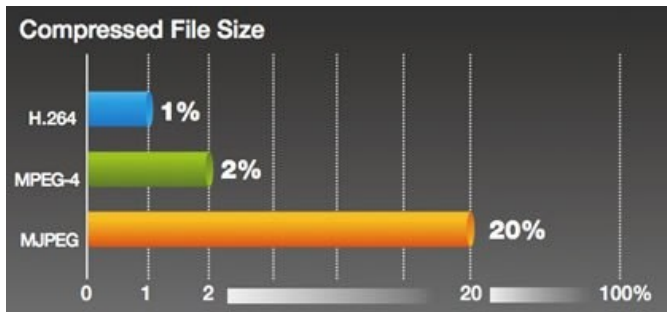
Recording Speed

The speed of recording is a critical part of any CCTV application. To have a smooth, gapless motion video, you must be able to real-time. A video is considered as real-time video when its recorded at 30 fps (frames per second). This ensures a consistently smooth video. All Vonnic DVRs record at 30 fps per camera.

Storage Capacity

Another important feature of a DVR is its storage capacity. When configuring how much storage you need, you must consider the following:

- How many days of video do you want to store?
- Number of cameras recording?
- Frames per second each camera is recording?
- How many hours per day to record?
- How many days of the week to record?

For example, a CCTV system with 6 cameras each recording at 30 fps, 24 hours a day, 7 days a week needs 1.4TB of storage space to maintain the data for 30 days.

Network Access and Remote Viewing

Network access is crucial to remotely access or monitor a video feed across a LAN, WAN, or via the internet. Newer DVRs feature the ability to remote view over a 3G network making it convenient for mobile phone users to access their DVR from virtually anywhere.

Advanced DVR Features

Other important features to consider when purchasing a DVR:

- Motion Recording (enables motion trigger recording)
- PTZ Support (enables pan, tilt, and zoom control)
- POS Integration (enhances loss prevention)
- Backup Solution (method to archive or extract data)

Accessories

When installing any CCTV surveillance system, in addition to the cameras and DVR equipment, there are many other accessories that may be required for completion. I have listed below some of the more common accessories used by installers.

Cables

Video signals are transmitted from the camera to the DVR via coax or RG59 cable. Since power has to be ran to the camera as well, most installers use Siamese cable which combines the RG59 and power cable in one. Siamese cable comes in premade lengths and spools of 500 or 1000 feet. Premade cables are convenient as they already have the BNC and Power connectors attached. For longer runs, installers prefer to use the spooled cable to customize their lengths.

Connectors & Adapters

Any CCTV installation may require various connectors and adapters. Connectors are components used to conduct and transfer signals from one cable or device to another. Adapters may be necessary to convert one type or gender of a connector to another.

Video Baluns

Video baluns are impedance transformers that allow the transmittance of a video signal (75 ohm) over cat 5 cable (100 ohm). They are used in pairs to transform the impedance signal at one end and to transform it back at the other end. Mismatching impedance signals will cause delays in the signal transmittance resulting in a ghosting effect on the picture. Installers use baluns in areas where cat 5 is already ran making it more convenient or for transmitting signals over distances exceeding 500ft.

Power Supplies

All cameras require some sort of power source. Power adapters or distribution boxes are used in most installations. If installing 4 cameras or less, most installers will choose to use a power adapter and splitter whereas installations involving more cameras, they will use a power distribution box. When choosing a power adapter, be sure to get one that supports the voltage and amperage ratings for your cameras.

Wired vs Wireless

Wired Surveillance

A wired CCTV system requires the cameras to be physically connected to your monitor or DVR via a cable. The optimal choice for a camera security system is wired. Wired systems are more cost effective, provide the highest quality video, and no signal interruption.

Wireless Surveillance

A wireless CCTV system typically uses the 2.4GHz frequency to transmit the signal to the monitor or DVR. Most wireless CCTV cameras have a range limitation of 200 feet with clear line of sight transmission. Wall thickness and other interference may decrease this distance. Though a wireless camera offers greater flexibility when placing your camera, most still require the use of an AC adapter. Battery operated cameras and solar powered options are available but these often increase the cost significantly.