

CAMERA TUTORIAL

This tutorial will address some of the facts and myths of security cameras. We will try to keep this as non-technical whenever possible and only provide you with what you need to know or may be relevant. For more detailed information about the technological aspects you can visit other portions of our website or some of our other tutorials.

CAMERA STYLES

Cameras come in different shapes and sizes. Know that this in itself does not affect the picture quality. The shape rather should be looked at in terms of cosmetics, convenience of installation and camera placement. Two cameras with different housings and similar components should perform no different if constructed properly.

Dome Camera

Dome cameras typically are the best choice whenever possible

- When the camera is within someone's reach domes cannot be easily manipulated or vandalized
- Domes Install easy in drop ceilings – usually 2 screws
- Since a dome has a covered lens the direction the camera is pointing is hidden
- Domes can accommodate infra-red for Night Vision



NOTE: While dome cameras are the installation choice there are limitations. As the domes themselves are typically small you are limited in the size lens available. If you need to focus on long distances which requires a lens of 50mm focal length or greater it will not fit inside a standard dome camera. Dome cameras can be simple plastic ones or metal vandal-proof for public places.

Box Camera

- When mounting to a wall or any vertical area
- When viewing long distances where a long lens is required, which would not fit inside a dome or bullet camera
- When extreme low light conditions are not a consideration



NOTES: If the box camera is within someone's reach the camera is usually inserted in a protective enclosure. If the lighting is extremely low box cameras can be inserted inside enclosures that have built-in infra-red illuminators but the camera must be infra-red sensitive. Meaning it is able to utilize the infra-red illuminators from an external source.

Infra-red Cameras

- When there are extreme low light conditions
- When the camera is not within someone's reach

NOTES: The distances infra-red cameras can see are based upon its illumination capacity. Infra-red cameras have LED's, which cast out into the darkness. Realistically, a good rule of thumb (but not an absolute) is figure 1 foot for each LED. Therefore, if a camera has 30 LED's then it probably can see about 30 feet. There are some newer LED's called Cat's Eyes, which have more power, but they are not very common. You would notice a Cat's Eye by the extra large size of the LED's. With respect to infrared quality it has more to do with the intensity of the LED's and the distance they cover. One thing to note is that infrared LED's do have a limited life since they are illuminating so they do burn out over time. Just because one camera has more LED's than another does not mean it can cast a longer distance, there are different strengths in the LED's. Unfortunately, again for the consumer it is hard to properly compare.



Bullet Cameras

- When you want the camera to be inconspicuous but not covert
- When the camera is not within someone's reach
- When extreme low light conditions are not a consideration
- For shorter to middle distances

NOTES: As bullet cameras are small the type of internal boards and lens is limited. Accordingly, the picture quality of the bullet cameras cannot compare with other more traditional cameras, which can have double layer boards and camera function controls.



Covert Cameras

- Just as they say, these are meant not to be seen and come in all shapes and sizes from a wall clock to a sprinkler head or smoke detector

NOTES: It is important to check your local laws with respect to surreptitious recording. In some states certain types of covert cameras are illegal. For example, in New York State you are not allowed to install smoke detector cameras. With respect to recording audio, there are very specific laws, which vary from state to state. Some states require all parties consent to recording, while others only require a single individual.



Wireless Cameras

- When connection to the digital video recorder is not practical

NOTES: Remember though wireless is just for the video signal, you still need a method to power the camera. Wireless cameras can be found in most styles. For the most part wireless cameras require a line-of-sight to function properly. Distances will vary depending upon the strength of the transmitter and receiver, what other devices are in the same spectrum, etc. Realistically, you are looking at distances of 100' or less on affordable wireless equipment. There are external wireless transmitters and receivers that can attach to any standard camera and make them wireless, but the costs are incredibly prohibitive.



Pan Tilt Zoom (PTZ) Cameras

- When you want live control of the camera and adjusting the manual pan, tilt or zoom on a fixed camera is not practical
- When you want to set up a camera to tour the premises
- When you want to view several angles from a single camera

NOTES: Pan, Tilt, Zoom cameras cost anywhere from 5x – 10x the cost of a fixed camera. The Pan, Tilt, Zoom camera cannot record or see where it is not looking. You cannot pan, tilt or zoom after it has been recorded (this can only be done with a 360 degree camera). Making a PTZ camera wireless adds thousands to the cost. PTZ cameras can though perform various functions not possible with a fixed camera. You can control a PTZ camera and zoom in optically up to 36x and beyond digitally up to 12x giving zoom capabilities in the 100's. The PTZ's have intelligence and can be programmed to perform pre-defined tours and upon the event of an alarm the camera can swing to a specified location before continuing its tour. An operator can override and take control of the camera at any time.



“I have old security cameras can I use them?”

The simple answer is yes, but the newest generation of CCD (Charge Coupled Device) cameras, are much better than their analog predecessors of as recently as 3-5 years ago. You may say, *“I spent a fortune on those cameras. They must be good!”* Well, is the VCR that cost \$2,000.00 two decades ago (not even taking into account its real cost in terms of inflation) better than the one you can pick up at WalMart today for \$49.00? The answer is a resounding no. Technology changes and advancements are made. In fact, to the contrary, it is a technologically inferior dinosaur. Much the same can be said for surveillance cameras.

Future generations of cameras will continue to improve upon this. Although cameras are called Digital CCTV cameras they are not “pure” digital. CCD is defined as follows:

So what is different between the analog cameras I bought a few years ago and now? It is most evident in the sharpness, definition and quality of the picture. If you're still unsure, we recommend replacing one or two first and compare the old with the new. Make sure when you compare cameras that you do it as apples-to-apples, meaning it is a similar shot, as lighting and various other conditions will affect picture quality radically.

INDOOR vs. OUTDOOR CAMERAS

Ostensibly, indoor and outdoor cameras are the same in terms of styles, sizes and shapes. The principle difference is outdoor cameras are at a minimum weather-proof.

While rain is a primary issue other considerations such as moisture, dust, sand, snow, frost and humidity need to be addressed. Accordingly, some cameras are equipped with heaters and blowers to counteract the elements, while others can be housed in outdoor enclosures for the specified purpose.

Outdoor cameras most likely have to address low light conditions for evenings. Accordingly, they either have to have infra-red or some day/night technology, which today are quite affordable.

NIGHTVISION AND DAY/NIGHT CAMERAS

For low light situations there are two possible camera technology solutions. If there is total darkness then the only possibility is infra-red or otherwise known as night-vision.

Infrared (IR) radiation is electromagnetic radiation of a wavelength longer than that of visible light, but shorter than that of radio waves. The name means "*below red*" (from the Latin *infra*, "below"), red being the color of visible light of longest wavelength. The infrared portion of the spectrum has a number of technological uses, including target acquisition and tracking by the military; remote temperature sensing; short-ranged wireless communication; weather forecasting and for our purposes night-vision.

Infrared is used in night-vision cameras when there is insufficient visible light to see an object. The camera uses the infrared portion of the electromagnetic spectrum, sometimes referred to as thermal imaging. The radiation is detected and turned into an image, hotter objects showing up in different shades than cooler objects, enabling the camera to see warm targets, such as human beings and automobiles.

Day/Night technology is a sensitivity enhancement technology which improves light sensitivity of a camera by a factor of 2 for visible light and a factor of 4 for near-infrared wavelengths. It still cannot work in near zero light as will an infrared camera.

While both infrared and day/night technology sound expensive, both have become commercialized and are surprisingly affordable. The difference in camera pricing for one of these cameras versus a traditional camera is nominal.

The rule of thumb we like to use is if you walk the area where you intend for the camera to be and view it at its lowest possible lighting, if you can see with the naked eye, then the day/night camera should be fine. If you cannot see, then an infrared camera would be recommended.

CCTV cameras similar to your movie camera are rated in terms of "lux" for purposes of lighting. In addition to night vision and day/night cameras there are low light cameras, which are standard cameras with a low lux rating (0.1).

VIDEO QUALITY

The manufacturers of the CCD's (which is the main guts of the camera) primarily make 2 or 3 basic grades of product in terms of camera lines of resolution. There is a standard resolution for color cameras (which people quote as anywhere from 330 TV Lines to 380 TV lines) a high resolution for color cameras (which people quote as anywhere from 450 TV Lines to 480 TV Lines) and a new standard some refer to as "high definition" (which it is not true high definition – with quotes of anywhere from 520 TV lines to 550 TV lines). For black and white a 420 line and 600 lines are similarly standard and high resolution, respectively.

The more lines of resolution in the picture, the higher the quality of the picture should appear. You will find many companies will quote a higher number of lines to gain a marketing advantage, when in fact the information is incorrect. The CCTV camera business is dominated by 2 companies that control more than 95% of the CCD market; Sony and Sharp. It was very similar to the television tube market, which despite the name on the set; it was either a "Trinitron" tube from Sony or a Black Stripe tube. These companies make a limited number of CCD's for the surveillance market.

In our opinion, Sony offers a much higher quality picture and richer colors than Sharp. There is a significant price differential to go along with it. In fact, in our opinion a standard resolution Sony CCD appears better than a high resolution Sharp CCD.

This brings us to another issue. You will see some websites or companies publish specifications that are much higher than others. Be suspicious, as they should pretty much be the same; since the majority uses the same identical components and all they do is assemble. Some unscrupulous individuals will also try to sell you product represented as one component when in fact it's another. The 2 main components of the CCTV camera are the CCD and the Integrated Circuit (IC). So they may use a Sony CCD and a cheap IC. This is one of a handful of concerns.

This is a problem since the consumer has no way to easily identify whether it's a Sony or Sharp CCD or it's a standard or high resolution. It all comes down to credibility. Since the CCD's and IC's are commodities most pay similar component costs. Accordingly, suspicion should be placed on anyone selling dollar bills for 75 cents, meaning a similar product is being sold by one company well below the price point of the rest of the market. The only way to be able to truly identify the specifications of a product is if it is a well-known branded product and not a "blank box or "brand-x." The Internet creates part of the problem as just about anyone can hang up a shingle and promote themselves, as someone even if they are working out of a basement.

CCD quality is but one concern. We talked about earlier lux ratings. Even a high quality CCD has certain limitations. As such, you need the proper CCD for the job. Lower lux CCD's are more expensive and when you get into the area of day/night CCD's they can be significantly more than standard CCD's but not prohibitive.

CMOS cameras or digital cameras are referred to in terms of megapixels and are very uncommon as of this date due to the prohibitive costs associated with equivalent product to those of the CCD. There is a lot of confusion with respect to CMOS cameras. Probably the cheapest cameras in the market and the most expensive cameras in the market are CMOS cameras. There are CMOS cameras like your webcam that are made into CCTV cameras, which are inferior in quality in every respect and there are high megapixel digital cameras, which can cost in the \$1,000's, which are not necessarily much better. They are at opposite ends of the spectrum. CMOS cameras and the underlying IP camera technology have a long way to go.

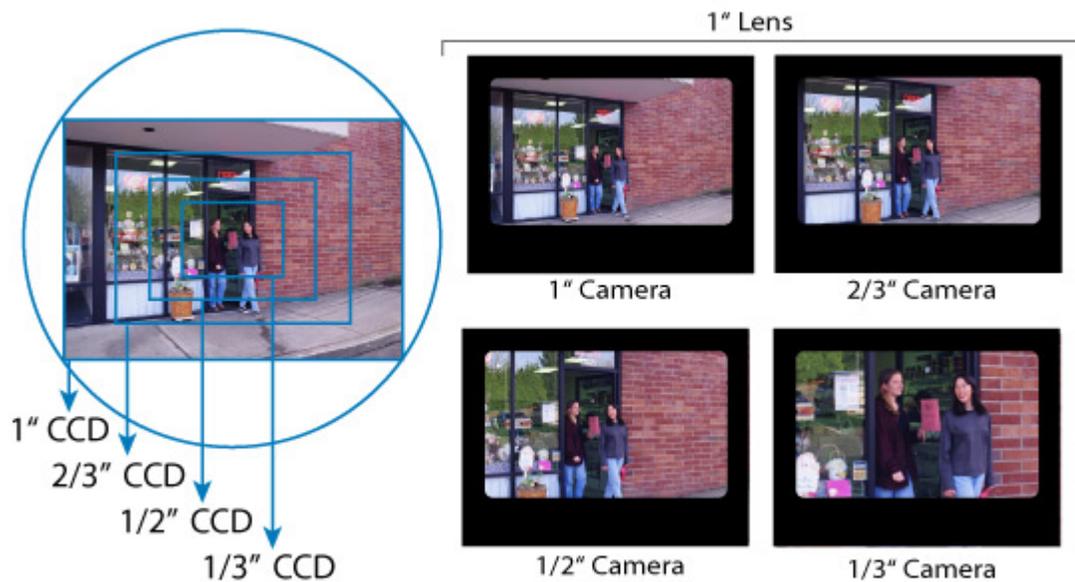
LENS SELECTION

Iris: *The iris on the lens determines how the camera will adjust to light. A camera lens iris come in a few varieties.*

- Auto-iris - has the ability to adjust automatically to lighting conditions.
- Manual iris - is one that you can adjust but as it states it is manual.
- Fixed iris - means just that, it is fixed and cannot be adjusted.

Focal length:

When selecting a lens, you are trying to determine the area you wish to cover; the width of the shot, and where the central focal point will be.



By clicking the following link you can find out what lens you will require in terms of the field of view. [Aventura Lens Calculator](#)

The unfortunate problem is; your needs for a shot in a particular camera view might fall into two categories. Let's take, for example, you have a retail shop, and the camera is set up to cover a large area, you may be able to see an incident occur, but not be able to distinguish the facial features because of where it occurred. So, you have one of a few choices – make sure you select a high resolution lens so you have better detail of the image, or select a higher millimeter lens to cover a smaller area, backed up with an additional camera to cover the balance of the target area.

There are also some other tricks you can use to minimize costs. You may not have to use a whole slew of cameras, if you know you are going to get a close-up view of a subject elsewhere. For example, if you had a camera at the front entrance to the store, that the subject has to pass through, then you have a good look at them and what they are wearing. So, even if they move about the location elsewhere, you can associate the face you saw at the front door, with the clothing they are wearing seen from a distance.

Aventura Technologies - Camera Tutorial

Although there are a myriad of lens sizes, there are a small group that comprise 95% of the market. Typically, they are 2.8mm (wide-angle), 3.6mm, 4mm, 6mm, 8mm fixed lens or a 4mm-9mm, 6~15mm or 6~60mm vari-focal lens. The vari-focal lens gives you the ability to dial in manually anything within the focal range. So, when you install the camera, you would make adjustments until it covers that area you desire. Vari-focal lenses cost significantly more money than the fixed 4, 6, and 8mm lens but the quality is also better. There is a measurable difference. The following screen shots give you an idea of what each lens will look like at certain distances.



Selecting a lens, as well as the number of cameras, at times can be a difficult task because you have a balancing act of trying to keep cost down at the same time as accomplishing your goal. So, do you go with better quality cameras, but fewer of them, or lesser quality cameras but more of them? Although, when you start to add more cameras, the cost of the DVR increases because you require more available channels (channels are ports that cameras plug into on the digital video recorder).

So it is all dependent on your budget. We like to try to back into a solution predicated on the budget. This way you have a matching system of quality all the way through, and one that allows for change and growth plans.

When a lens is fixed, understand the image is as you see it. Forget what you see on the television show CSI. Even with a high-end digital video recorder will not get any larger than the original. Can the software increase the size of an image? Absolutely, but when it does so, it pixelates, meaning it gets grainier and less crisp. Don't believe claims that say they can read a license plate on a speeding car at 100 feet away with a standard lens or what you see in movies. It's not happening. The only quality you get when enhancing the original is lesser quality.

Lens Quality

What you also need to know about lenses is there are incredible differences in quality. There are plastic lens and glass lens. There is high quality glass and inexpensive glass. There are metal bodies and plastic bodies. There are precision mounts and some not so precise. No different than your still camera there are several thousand dollar Nikon and Leica lens and the ones you have on a disposable camera.

This again is a problem since the only specifications that a supplier provides you with is the iris function and the focal length. So you are relying on reputation. Even if you use a good quality CCD if the lens is not any good the pictures will suffer. There are CCD lens for less than \$2.00 from China.

CAMERA ASSEMBLY

The assembly of the components is critical as well as how the product is quality controlled. This speaks to the durability of the product. The last thing anyone wants is hanging a camera in an unreachable place and then find out you have to go back a couple of days, weeks or months later when it malfunctions. So how much does a lift truck cost for a day to get to the camera? How much is a half day of your time worth? A few extra dollars spent on a better camera may actually save you a lot of money, time and headache.

MOUNTING LOCATIONS

Security cameras are just that for security. Mounting locations are important for several reasons, some more obvious than others. If at all possible mount a camera that is out of physical reach. The concern is not always just physical reach but vandals at times will throw things at the camera, which will either break the camera or change the viewing direction. This is one of the reasons for using vandal-proof dome cameras. Not only is the camera location of concern but so is the wiring. If vandals can unplug a camera or cut a cable it's the same result. The trade off on making a camera inaccessible is when you want to periodically clean the lens or protective cover.

The location is also important so that you may be able to have a proper viewing angle without obstructions.

One common mistake is not a vandalism issue but rather a lighting concern. Cameras that are exposed to the sun need to be properly positioned and "shielded" so that the camera is not pointed directly into the sun.

SECURITY

There are a variety of ways to deal with the security of the cameras in various environments. The problems you need to concern yourself with are – is the camera within physical reach of someone where they can easily either block the view of the camera (whether it be with spray paint, bubble gum or anything else), break it by hitting it with something, repositioning it so it is no longer viewing what it should or simply disabling it by unplugging it or cutting the line.

The use of dome cameras in indoor environments is a good remedy for most of these issues. If the dome camera is mounted into either a tile or a ceiling with the connections above, it is difficult for someone to easily tamper with it. Depending on which dome you buy, many are vandal proof lexan material so will withstand a good shot to it (not a gun shot!) and others even have tamperproof screws.

In the outdoor environment the cameras being mounted high enough alleviate many of the problems. The reason you put the cameras in an outdoor housing is for a few reasons. First, we already discussed the issue of weather. Next is the fact that if something gets on the lens it will easily obstruct the view. If something gets on the glass of the housing unit being that the housing unit is set a small distance away from the lens while it might still be obstructed you will still have a better view. Also if someone throws something at an exposed camera, the camera itself is susceptible. If a camera is mounted in a housing, it is just the housing that is susceptible, not an expensive camera.

Wiring a camera in outdoors environments requires the wires either inside the wall or inside conduit so that they are secure.

Some of these suggestions may not be required for simple installations, but are suggestions if you are concerned about these issues. There is no shortage of methods of vandalism, where un-secure cameras can be altered to negate what you are attempting to monitor. A standard camera mounted in a store that is supposed to be watching employees is minimally moved with a broom each day without any notice. After a week or two the camera may be pointing completely elsewhere, there are innumerable stories.

LIGHTING CONDITIONS

The human eye adjusts to changing light conditions by the iris dilating and constricting. Without it, think of what it would be like – it would be either too bright or too dark depending upon how your iris was fixed.

Similarly, the camera needs to adapt to changing light conditions. One of these adaptations is performed by a function known as “auto-iris”. Auto-iris is a lens component for controlling light intake electronically. The auto-iris function is built into the CCD imaging circuit of the camera and works in conjunction with the auto-iris lens. It works similar to the human eye allowing more light in when it gets dark, and reducing the intake of light when it's bright out. A manual iris serves no purpose in changing light conditions, as you are not going to climb up on a ladder and make changes to the lens throughout the day. A manual iris becomes applicable where you have fixed lighting conditions, such as in an interior office or hallway, which is not subject to ambient light from outside windows or skylights.

One mistake many people make is pointing a camera right towards the sunlight. Avoid this at all costs; if not completely possible, angle it so it is not direct or try to get a camera that has a sunshade on it. Pointing the camera right at the sun will virtually blind it regardless of the camera iris.

There are other lighting conditions to consider. The auto-iris reacts to what it sees and in some conditions may be misleading; requiring some other corrections. Back lighting can be an issue, and as a result washed out images may appear. To correct this, the CCD has a backlight compensation (BLC) function that may be automatic or may be turned on and off via a dipswitch located on the camera. Back Light Control dims intense back light automatically for a brighter picture of an object.

Another issue is when the light gets too low, the iris can no longer compensate. As the iris is an open and close function it needs other parameters to be addressed. CCD's have a function known as Automatic-Gain-Control (AGC), which compensates by brightening images under low light conditions.

Different CCD's have different abilities to adapt to low light conditions. This is known as a lux rating; the lower the number the better the adaptation to low lighting. Black-and-white cameras actually adapt better to low light than color cameras. In fact, in lighting conditions such as nightclub environment most likely a color camera will give unsatisfactory results where a black-and-white camera would excel.

Below is some sample lux ratings:

Direct Sunlight	107,000 – 140,000
Full Sunlight	11,000 – 22,000
Overcast Day	1,000
Retail Shop	500
Office Setting	300
Twilight	10
Deep Twilight	1
Full Moon	0.1
Moonless Night	0.0001
Overcast Night	0.00001

LOW LIGHT CAMERA VIEWING

For extreme darkness, the human eye as well as the camera iris has their limitations. There are two solutions to this, each having their advantages and disadvantages. The first is the Day/Night technology, which features a structure that is highly sensitive in the “near” infrared light regions, a range that is invisible to the human eye. This makes it possible to see and record in the dark by irradiating near infrared light on the recorded media.

Light in the near infrared light region which has long wavelengths is converted into photoelectricity deep in the semiconductor's (CCD) silicon. Conventional CCD structure, sensors were incapable of efficiently gathering the charge which has undergone photoelectric conversion. Day/Night technology allows a charge due to near infrared light, which was ineffective in conventional CCD devices, to be used as video information.

Standard Camera



Camera With Day/Night Technology



While Day/Night technology can adapt to low light or “near” infrared light regions it cannot adapt to total darkness or the infrared region, in this case the use of infrared cameras are in order. Total darkness means total blackness, so if there is moonlight or street lights then Day/Night is more than capable. If you have an interior room with no

windows and no lights this would fall in the infrared range.

Infrared (IR) radiation is electromagnetic radiation of a wavelength longer than visible light, but shorter than microwave radiation. The name means "below red" (from the Latin *infra* , "below"), red being the color of visible light of longest wavelength. Infrared radiation spans three orders of magnitude and has wavelengths between 700 nm and 1 mm.

The Earth's surface absorbs visible radiation from the sun and re-emits much of the energy as infrared back to the atmosphere. Certain gases in the atmosphere, chiefly water vapor, absorb this infrared, and re-radiate it in all directions including back to Earth. Infrared is used in night-vision equipment, when there is insufficient visible light to see an object. The radiation is detected and turned into an image.

You will notice that most infrared cameras have a series of LED's. These LED's are what cast out into the darkness. Think of it as a flashlight you can only see out to the distance of the illumination capacity. You will see infrared cameras rated at distances. Remember these distances may be exaggerated and under optimal conditions. One need's to understand also the field of view is limited to the illumination area cast onto by the LED's which may be small. You are not going to read license plates 100 yards away in the darkness with standard reasonably priced commercial infrared cameras. This is not Rambo.

POWER

Many cameras today are 12-volt. The reason we mention this is cameras of the last generation were primarily 24-volt. So if you plug a 12-volt camera into an existing line that is 24-volt, you may very well destroy the camera. Many of the better cameras today are dual voltage and can support both.

For the most part CCTV cameras can be purchased in 3 voltages: 120VAC, 24VAC and 12 VDC.

120VAC is not very common as it has some drawbacks the main being the requirement of having an outlet within 6 feet of where the camera is to be installed.

24VAC historically has been the professional's choice although more and more we see 12 VDC being used extensively. In fact, the majority of cameras available in the market today are 12 VDC. Longer distances though can be run for powering 24VAC wires. 12 VDC can also be used but distances are somewhat shorter than 24VAC due to voltage drop. You can view a voltage drop calculator in our *"How it Works" section* or by clicking on the following link. Distance only becomes an issue when running longer than several hundred feet. The convenience of 24VAC and 12 VDC is you can run the cables from the respective camera positions to a central point into a single power panel.

The camera power supply is most commonly connected using low voltage 18 or 20 gauge wire. The popular method for running video from the camera to the monitor or recording device is across an RG-59 or RG-6 coaxial cable. For convenience, "Siamese" cable can be purchased which houses the video and power under a single jacketed cable. Alternatively, a new method of cabling is running the video across Cat-5 computer network cable. Cabling is discussed further in our ["How it Works"](#) section of the website and elsewhere in this tutorial.

Each and every camera requires power. There are a few ways to power a camera.

1. A small power pack can be connected to the camera and plugged into a local wall outlet, typically within a 6' range. This in many cases is not possible as the cameras are located where there is no wall outlet.



2. Electrical wire can be run from each camera back to a central location and all the electrical wires are terminated in a power panel.



3. Electrical wire can be run from each camera back to a central location and all the electrical wires can each be attached to individual transformers, which can be plugged into a power strip and then into the wall. This method is not recommended as it usually is not very neat.



4. There is a type of cable known as "Siamese" cable, which houses a cable for video and an electrical wire for power, all in one single jacket. This way you only have to run a single cable from the camera back to the central location where the DVR and power are to be terminated.



CAMERA CONNECTIONS

When connecting your cameras to the DVR in terms of video, either coaxial cable or category 5 twisted pair cable should be used.

The most traditional coaxial cables for video installation are RG-59 and RG-6 (RG = **R**adio-**G**uide).



BNC connectors (**B**ayonet **N**eill **C**oncelman connector-sometimes called a **B**ritish **N**aval **C**onconnector or **B**ayonet **N**ut **C**onconnector) are molded or crimped onto the RG-59 or RG-6 coaxial cable ends for connection to the camera and DVR.

Standard pre-made RG-59 coaxial cable lengths with BNC ends attached are 3', 6', 10', 25', 50', 75', 100' and 150'.





RG-59 and RG-6 coaxial cable also come in bulk rolls of 500' or 1,000' without BNC ends attached.

Although RG-59 and RG-6 cables are great stuff, they are relatively heavy and may be awkward at times, depending upon where you have to pull the cable. While cable manufacturers say you can run RG-59 out to about 750-1,000 feet, we recommend not to run RG-59 more than 600' from a camera to the DVR, otherwise you may experience signal loss and subsequent picture interference. RG-6 can usually be run at least 300 – 400 feet further than RG-59, but it does cost more.



With the advent of a new product called “*video baluns*” (**BAL**anced **UN**balanced), you can now run video over a Category 5 cable. A balun is a device that connects a balanced line to an unbalanced line, such as a twisted pair to a coaxial cable. A balanced line is one in which both wires are electrically equal. In an unbalanced line, such as coaxial, one line has different properties than the other.

The Category 5 cable also known as Cat-5 carries four twisted pairs of copper wires in a single jacket, allowing for more camera runs on a single cable. Some even run power over the Cat-5 but you run the risk of interference, even if the cable is shielded. If you are going to run power over Cat-5 cable, we recommend running video on one cable and power on a completely separate cable. Cat-5 is also much lighter and easier to work with than RG-59. Cat-5 cable sometimes called network cable is the same cable you plug into your PC from the network. While distances beyond 1,000' may become a video signal problem for RG-59 and RG-6, Cat-5 can comfortably extend out beyond 1,000' and with “*active*” video baluns that distance can be increased to 10,000'. Active video baluns are baluns with transmitters and receivers. Much debate is made as to whether RG-59, RG-6 or Cat-5 produces a better signal. In our opinion they are both fine and have their place.



SUMMARY

Hopefully we have provided you with enough of an education to make an informed decision. In review:

1. Calculate budget
2. Identify the proposed number of cameras
3. Decide on the camera style based on the space available and environment
4. Calculate how many high resolution and standard resolution cameras you need
5. Select the lens and iris type
6. Figure out how you are mounting the camera so it is safe and secure
7. Verify lighting conditions
8. Decide on what cable type and length you will use
9. Decide on location to centrally locate the monitoring station and power termination