VIDEO SURVEILLANCE GUIDE

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Introduction

Security is a major concern today for all business and homeowners. This guide aims to educate you on the basics of cctv, video surveillance, the equipment used and its abilities. We will start with an explanation of

The first step is to understand the different technologies, their operations and benefits. The technologies range from the 20 year old "Analogue" to cutting edge "Digital". There is also many different types of equipment ranging from the basic 4ch Standalone DVR, to multiple PC Linux based system with remote access and upto 256 cameras.

Your requirements and what you want to accomplish will directly influence the system that is right for you. You should determine how many cameras you will require and the amount of footage you will need to keep at any one time. Typically a system should hold between a week and a month worth of footage, in some situation more may be required. Though it is true that expensive applications are packed with the best features, you can always look for an affordable DVR security solution which will meet your needs.

There are just some of the things that you will need to think about when looking for a security solution. Should you have any questions before deciding to purchase a Digital Video Surveillance system, our sales representatives and Technicians are more than happy to answer any of your questions.

DVR's (Digital Video Recorders)

A DVR's purpose is to take analogue video signals and records it in a digital format to a disk drive or other memory medium within a device, many are designed to record audio as well. You will then be able to easily retrieve the data at a later date. In some DVR security systems remote access to security footage using a PC can also be achieved by connecting the DVR to a LAN network or the internet. There are 3 types of equipment to consider:

Monitors and Multiplexers	PC Based Systems	Standalone Systems

Monitors & Multiplexers

They are only 2 ways to view cameras, one is a VGA monitor and the other is an analogue or composite monitor. A VGA monitor is designed to work with a PC and some standalones DVR's. It is much higher quality than an analogue monitor. Analogue monitors are TV monitors which can display one composite video signal. In other words they have one video input, they are nothing more than high resolution TV's. Multiplexers can display 4, 9 or 16 video signals on one monitor. The multiplexer only provides the ability to view multiple cameras on one screen. It does not provide the ability to record. All modern DVR's now have a multiplexer built in so that multiple cameras can be displayed onscreen.

PC Based Digital Video Recorders

A PC based DVR is comprised of a computer, video capture cards and custom written software. These systems are considered to be the best systems available. They provide far better video recording clarity over older analogue systems and are easier to use aswell as more flexible than Standalone DVR's. The two different types are Linux based DVR software and Windows based DVR software. These units are available as kits which you install on your PC or as complete factory built DVR. Some also include the ability to connect to and record cameras over a network.

PC based DVR's are programmed and operated with a keyboard and mouse. The video is recorded to the computers hard drive in a compressed format. This compression allows a huge amount of video to be stored. These systems are designed so they do not require any scheduled action to maintain the video recordings. They record video to the hard drive until full, and then begin to overwrite where they write over the top of the oldest footage in a first in first out fashion.

The video is played back on the computer monitor or can be saved to a floppy, burned to a CD/DVD, copied to a USB device or transferred over a network. Some systems such as the DVRPLATINUM and DVRDIAMOND systems save the video so it can be played back on any PC with Windows Media Player. You can also print or save a jpeg image of any specific video frame. These systems allow you to view and playback any combination of cameras without interrupting the systems recording process.

Windows based DVR software

Windows based DVR software was the first type to be released over 10 years ago. Unfortunately the DVR software itself has to be written to work within the Windows based environment and as such can potentially suffer from the same problems any PC would.

Linux based DVR software

Linux based DVR software is far superior to the Windows based DVR software as it has the entire operating system written for the single purpose of the DVR recording software. It is highly resistant to Virus and Hacker attacks as well as Software corruption. Building or rebuilding the system take only a couple minutes and can be done by anyone.

Linux based Network DVR software

Linux based Network DVR software is the identical to the Linux based DVR software with additional support for either network cameras or NT server units. This system can support any number of analogue and network cameras up to a maximum of 16. An NT server is a box to which you would connect a standard analogue camera, and then have it converted to a network signal which can travel across a network or even the internet.

Standalone Based Digital Video Recorders

A Standalone based DVR is built specifically for video recording. These units are very similar to a VCR and are built from the ground up to perform one specific function, record video. While they do operate some software internally, the video processing is hardware based. It is this hardware which provides the live viewing and high resolution recording.

Most are programmed with a hand held remote and buttons on the front of the unit, much like a regular VCR. Some can provide high resolution digital recordings which match the quality of a PC based DVR and other features including the use of a mouse. They can be very reliable and cheaper than a high end PC based DVR.

A disadvantage of a standalone DVR is that the global framerate will be dramatically decreased when using high resolutions, e.g. A 100fps global dvr on 352x288 resolution will become 25fps when using a 704x576 resolution. This does not affect PC based DVRs.

The video is played back on the DVR itself, burned to a CD/DVD, copied to a USB device and even copied over a network, just like the PC based DVRs.

Features Explained

DVR's are available in 4, 8, & 16 channels:

All DVRs will come with either 4, 8 or 16 camera inputs, however some new machine will allow upto 32. Should you require more there is the ability to use multiple machines and multihost software. DVR's are unable to be expanded to more channels so it is wise to think ahead before implementing a system.

High / Low Resolution:

All DVRs can record at the low resolution of 352x288 pixels, while newer DVRs are also capable or recording footage at the high resolution of 704x576 pixels. Please keep in mind that recording at a higher resolution will use more disk space and framerate.

Name1	Name2	PAL resolution:	NTSC Resolution:
D1	4CIF	704x576	704x480
HD1	2CIF	704x288	704x240
QD1	CIF	352x288	320x240

Framerates:

Framerate or FPS (Frames per second) is a term used to describe the amount of frames or images taken per second. Realtime recording consists of a 25fps, e.g. 25 images are taken per second. Many DVRs will operate on a basis of a global framerate, this means that if you have a 100fps global, you can assign frames per second to each individual camera up to a maximum of 100. Please keep in mind that standalone DVRs are subject to decreased global framerates when using higher resolutions.

Realtime Display:

Realtime display is a term used when the on screen display is showing a live display regardless of what the recording framerate is set to. e.g. the recording framerate can sometime give the effect of footage being jumpy, and this will not affect the realtime display only recordings.

Monitors and Spot Monitors:

A monitor can be either VGA or composite depending on you system. This just allows you to view the cameras and access the menu on the DVR itself. A spot monitor is always a composite signal and will allow you to see the cameras only, in some cases it can be customised to view upto 16 cameras at one or sequence through 1 camera at a time.

Loop output:

A loop output from a camera is generally for allowing you to run each channel to an additional DVR / multiplexer, or to an individual monitor.

Networking:

Some DVR's are capable of networking and even remote access, this allows you to view the cameras and even recorded footage anywhere in the your office or the world. PC and Standalone DVRs with networking abilities will use a client program to access the DVR, some models are also capable of being accessed by internet explorer.

Remote Access:

Remote access uses the network ability of a DVR to access the DVR within the local network or across the internet. The DVR's remote access will normally let you view the cameras remotely, and some systems will also allow you to search, backup and setup. Remote access includes the use of a web browser or a provided client software. Some DVR's also support a multihost software whish is a remote access program designed to be able to connect and view upto 16 DVRs or 256 cameras at a time.

When using remote access with a VDR system, it is recommended that you also have a fast internet connection of at least 1500kbps download and 512kbps upload.

Backing Up:

All modern DVR's give you the ability to backup footage to another device. The most common ways to backup include to a CD or DVD, to a USB device, to a floppy disk and over a network. Backing up will allow you to take a copy of the footage to store or give the authorities.

MJPEG / MPEG4 / H.264:

These are different types of encoding or compression. Mjpeg has been around the longest and consists of multiple jpeg images which are played one after the other to create moving video footage. Mpeg4 is the most common compression standard and can be viewed on any windows media player, it can also been known as avi, divx and xvid. H.264 is the most recent and highest compression standard available, however it is not very common and cannot be played back without special codec's or players.

Hard Disk Drives:

Also known as a HDD, this is the storage device for software and other data including recorded footage. Hard Drives typically come in 80Gb, 160Gb, 320Gb, 750Gb, and 1Tb (or 1000Gb) sizes. The more storage you have the more recording time you will be able to get.

Watermark:

A watermark is an invisible image inserted into the background of a recorded image. The Watermark allows the image to be examined and ensure that the footage has not been tampered with.

Timestamp:

Timestamping is usually placed on the lower right corner of an image and displays the exact time and date of which the footage has been recorded.

Audio:

Most DVR's are capable of recording audio, however it is illegal to record audio in Australia without the expressed written consent of all those being recorded. Addition equipment such as microphones and speakers will be required.

PTZ Control:

A PTZ (or Pan/Tilt/Zoom camera) is capable of being controlled by a DVR or PTZ keyboard. Meaning the DVR or keyboard can tell the camera to move left, right, up, down, zoom in and zoom out. Typically these cameras are more expensive, but very useful. And work on the RS485 system.

Scheduling:

Scheduling allows you to set what times and days you wish to have the DVR recording. Most systems are set to record 24hours a day, but can also be set to motion.

Motion Detection:

Motion Detection refers to a part of the Software which can detect movement of any sort, on a camera. The DVR can also be programmed to record only when motion is detected, this is incredibly useful for increasing recording times and efficiency.

Triplex/Simplex:

These terms usually only refers to a standalone based DVR. Simplex means that it can only perform one task at a time. e.g. You will have to stop the recording to be able to search. Triplex means that a DVR can record, search, backup etc all at the same time.

DIO (Digital Input Output):

A DIO (Digital Input Output) or Alarm Input Output can be used to sense a trigger from an external source such as a door or PIR, and then trigger an event within the DVR such as recording. It can also be used so that the DVR can trigger an external alarm system or device.

Rack mount:

Rack mountable DVRs are able to be placed or mounted in a 19" rackmount cabinet for secure installation. This is commonly used when you have multiple units or are integrating into an existing system with PC servers.

Cameras

A recording system will only ever be as good as its cameras. Most modern cameras are high resolution meaning they will easily support 704x576 pixels. A camera is rated by how many TVL (TV lines) it can output, this is normally between 350 – 580 (upto 700 for B/W) the more lines, the higher the picture quality. You may also see that the cameras have either a 1/4'", 1/3" or 1/2" ccd which refers to the size of image sensor that is capturing the image. Normally, the larger the ccd, the higher quality the picture can be.

Performance	Colour	Black and White
Low	350 Lines	500 Lines
Standard	480 Lines	540 Lines
High	520 Lines	600 Lines
Ultra	580 Lines	700 Lines

Cameras will come in many different types which will include Indoor, Outdoor, Weatherproof, Armoured, Domes, Bullets, Full Bodies, Wide Dynamic, Day/night, Infrared, PTZ's, IP or Network based and Wireless. The following information should be considered when choosing cameras right for you:

Indoor Cameras:

Indoor cameras come in all types, sizes and styles. These are cameras that can be stylishly designed for the interior of your home, or perhaps just not designed to take the punishment delivered by the weather. A dome camera can be mounted on the ceiling or wall and adjusted to view any angle, small bullet cameras are another favorite due to their discretion.

Dome	Full Body	Bullet

Outdoor / Weatherproof Cameras:

The only difference between indoor and outdoor cameras is that the outdoor cameras are in an environmentally protected housing. Some housings have heaters and blowers to keep the temperature inside within the operating parameters of the camera. Others such as the mini outdoor bullet cameras generate their own heat for operation. Most standard cameras can be used outdoors with the addition of a weatherproof housing. All outdoor cameras and housings will have an IP (weather resistance) rating depending on the environment they are designed for.

Level	Protect Against	Details
IP00	Not protected	
IP51	Dripping water	Dripping water (vertically falling drops) shall have no harmful effect. Ingress of dust is not entirely prevented.
IP52	Dripping water	Vertically dripping water shall have no harmful effect when

	when tilted up to 15°	the enclosure is tilted at an angle up to 15° from its normal position. Ingress of dust is not entirely prevented.
IP63	Spraying water	Water falling as a spray at any angle up to 60° from the vertical shall have no harmful effect. Complete protection against dust.
IP64	Splashing water	Water splashing against the enclosure from any direction shall have no harmful effect. Complete protection against dust.
IP65	Water jets	Water projected by a nozzle against enclosure from any direction shall have no harmful effects. Complete protection against dust.
IP66	Powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects. Complete protection against dust.
IP67	Immersion up to 1m	Ingress of water shall not be possible when the item is immersed in water under pressure (upto 1m of submersion). Complete protection against dust.
IP68	Immersion beyond 1m	The equipment is suitable for continuous immersion in water under conditions which shall be specified by the manufacturer. Complete protection against dust.

Weatherproof PTZ	Outdoor Infrared Camera	Weatherproof Housing

Armoured Cameras:

An armoured camera is ideal for situations where it may be damaged or vandelised. They will be completely weatherproof and some will even withstand blows from a sledgehammer.

Armoured Camera	Infrared Veri-Focal Armoured Dome	Samsung Armoured Dome

Dome Cameras:

The dome camera can be mounted on the ceiling or wall and adjusted to view any angle. Although the dome is designed to protect the camera inside, not all are weather tight and should not be installed where they are exposed to moisture or extreme temperatures, however armoured and weatherproof domes are available. Some models of Dome cameras will also be veri-focal or have infrared illuminators.

Small Dome	Infrared Dome	Samsung Hi-res Dome

Bullet Cameras:

Bullet cameras are typically smaller cylindrical cameras for use in indoor and outdoor applications. They are a favorite due to their discreetness and many of the bullet camera models come with infrared or day/night capabilities.

Veri-focal Day/night Bullet	Large Infrared Camera	Basic Bullet Camera

Full bodied Cameras:

Full bodied cameras are the most common camera for any setup and have been widely used for many years. They feature a screw on lens so that you may fit any size lens you require for the environment. Some models will even have a built in lens that can be control electronically by the camera itself and remotely.

A full bodied camera typically will not have any infrared illuminators built in, but can come in may types including Day/night, wide-dynamic and IP. They are also commonly placed into a weatherproof housing for outdoor use.

Wide-Dynamic Full Bodied Camera	Samsung Full Bodied Camera	Built in Lense Camera

Wide-Dynamic Cameras:

A Wide-Dynamic camera has the ability to balance light levels in any lighting condition. This is extremely useful for making out faces while someone is in front of a bright area or doorway. Some cameras that aren't Wide-Dynamic can compensate for this also using Back Light Compensation, however this is never as effective as a Wide-Dynamic camera. Automatic Gain Control is also very useful as it can compensate for glare and brightness.

Standard Camera Image	Wide-Dynamic camera image	Wide-Dynamic Full Bodied Camera

Infrared or Day/Night Cameras:

These cameras provide high quality colour pictures during the day and when the light levels drop past a minimum level, they automatically switch to night vision or black and white mode in complete darkness. When the light levels increase the camera automatically changes back to colour video. These cameras are very reliable and flexible and should be considered when designing your system.

An Infrared camera will use small LED's that transmit out infrared light surround the cameras lens. The LED's cast out light the camera can see but the human eye cannot. The distance a camera can see in the dark is based on how powerful the LED's are, and some cameras can see up to 90m in complete darkness.

A Day/night camera needs very little light to operate, and work well in most applications but do not have their own illuminators. Some Day/night cameras have an IR pass filter and can pickup infrared light from an infrared illuminator, however other with an IR cut filter will not be able to.


Veri-focal Day/night Bullet	Infrared Dome	90m Long Range Outdoor Infrared Camera

Pan Tilt Zoom Cameras:

PTZ cameras, as they are called, are considered "top of the line" in security cameras. They can pan 360 degrees, tilt 270 degrees, and optically zoom in as much as 30 times. They are able to be controlled and programmed with either a PTZ Keyboard/Joystick or through the software of a DVR. They come in both indoor and outdoor versions, which can be wall or ceiling mounted. Some models also offer Day/Night and wide-dynamic abilities.

Indoor Recessed PTZ	Wall Mount PTZ

These cameras are controlled with a two wire communication system named RS485 which can loop from one camera to another. Each camera can be set to a unique address and will be sent commands on a protocol such as Pelco D. Newer DVRs will have the RS485 control built in, one can be added externally, or a PTZ Keyboard/Joystick can be purchased separately.

PTZ Keyboard with Joystick	PC Based PTZ RS485 Control
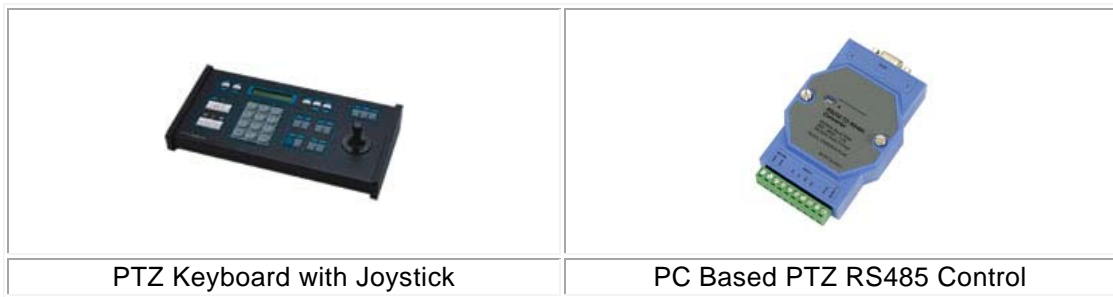
IP or Network based Cameras:

IP and Network based cameras are the latest technology and are tipped to be the future of cctv. They are very similar to a standard cameras however instead of outputting an analogue signal, they encode that video into data which can be transmitted across a network or wireless network connection. The only downside is that these cameras cannot yet be integrated with standard analogue systems or DVR's, however they do come with windows based recording software for saving data to your PC.

Also available are network based Analogue to IP encoders which can turn any camera into an IP camera. In some cases you can even use a second converter to change the signal back into an analogue system at the other end, giving you the ability to send your video signal across your existing network and then back into an analogue DVR. Some systems like the DVRPLATINUM can directly record from these units without the use of a second converter.

PTZ IP Camera	Megapixel IP Camera	Analogue to IP Encoder

Wireless Cameras:

Wireless cameras systems currently come in 3 types of technology. The 2.4 GHz Analogue, 2.4 GHz Digital and the 5.8 GHz Digital. 2.4 Ghz Analogue systems are the most commonly used systems and are relatively cheap, unfortunately they are also the most susceptible to interference and are unsecure. A 2.4Ghz Digital system or wireless lan is able to be secured and even encrypted, it is most commonly use by wireless IP camera setups. 5.8Ghz is the latest technology for wireless systems, it works the same as a wireless lan but on a higher frequency, so it is capable of transmitting over longer distances and is less susceptible to interference as there are very few other systems around running on the same frequency.

Unfortunately the downside of any wireless system is that it can be affected by interference, by the environment and other wireless devices within range.

Along with warless cameras you can use wireless transmitter/receiver sets so that any analogue camera can be transmitted wirelessly and back out to an analogue signal. For more powerful setups the 5.8Ghz Digital transceiver system (a transceiver will both transmit and receive wireless signal) can be used in conjunction with Analogue to IP encoders which can turn any camera into an IP signal, transmit it over a great distance and then use a second converter to change the signal back into an analogue system at the other end.
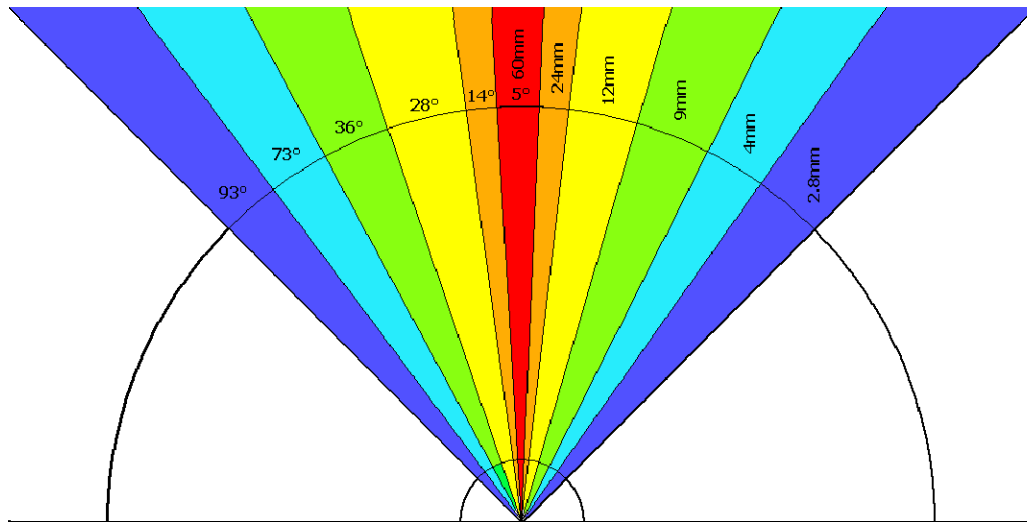
Analogue Transmitter / Receiver	5.8Ghz Digital Transceiver	Wireless PTZ IP Camera

Camera lenses:

A camera lens will play a huge part in the performance of a camera as it will directly relate to the angle of vision that you will be able to see. They can come in many different forms. Some will be able to be adjusted, some will be fixed, some can compensate for lighting conditions and all will be able to be focused. The different types are explained below:

- Veri-focal – These lenses can be adjusted to have a different focal length, meaning you can adjust between a telescopic or wide angle view.

- Fixed lense – These are a standard lense and will have a set focal length. However they will be cheaper to purchase.

- Auto-Iris – An auto-iris lense can adjust itself for brighter and darker lighting conditions. Effectively being able to automatically reduce glare and even the light level as required.

- Manual-Iris – A manual iris lense can adjusted for the environment when being installed, but is then left for the light level it has been set to. Once again, these will be cheaper to purchase.

2.8mm-12mm Vari-Focal Manual-Iris Lense	6mm-60mm Vari-Focal Auto-Iris Lense	8mm Fixed Lense

Based on a 1/3" CCD camera

Wiring and Powering systems

Video Cable & Maximum Distance:

All professional grade systems use coax cable to transmit the video from the camera to the recorder. The maximum distance the cameras can be from the recorder is a function of the cable rather than the camera itself. Using RG59 coax cable you can extend the camera out to 150 metres. Using RG6 coax cable you can run up to 250 metres. Cable is available in 100m and 500m boxes or short pre-made cables. Also available is DCOAXPWR which is a combined Coax and Power cable which makes it much easier to run cables to cameras. Both types can be bought in either black or white varieties.

If you have video wire runs longer 300 metres we recommend you use Cat 5 network cable with video Balun's. These units extend the distance a video signal can be transmitted up to 500 metres. The units take the signal from standard coax cable and converts the signal to be transmitted over Cat 5 Network cable. Video boosters and repeaters can also be used.

Power:

Cameras are powered with either 12V DC or 24V AC power. It does not matter which you choose as long as you use the correct power supply. 12V DC cameras are much more common however 24V AC can be run over much longer distances without any voltage drop.

As for power supplies, you can power each camera with its own plug in power supply, or you can wire multiple cameras back to a multi-camera power source. Both options plug into a regular 240V AC electrical outlet and then step the power down to 12V DC or 24V AC to feed to the camera.

Plug in power supplies are usually located with the camera. The multi-camera power supplies are installed with the DVR then a figure 8 power wire is run to each camera. We highly recommend using multi-camera for their cost effectiveness. Wallmount multi-camera power supplies will also be fused on each camera output. This design provides excellent protection from power spikes and surges.

Plug-in Switchmode Power Supply	**Multi-Camera Switchmode Power Supply**	**Multi-Camera Wallmount Power Supply**