What is CCTV?

Closed Circuit Television (CCTV): This is the technology behind capturing images from a video source at one end of the circuit and transmitting it through some type of transmission media to a receiving unit on the other end, for the purpose of security and monitoring activities.

Main components of a CCTV System:
Their are four basic components crucial to the make-up of a CCTV system

1. Video Source (Camera)
   The starting point in the system. This is the device responsible for the monitoring and capturing of the image at the source.

2. Transmission medium
   The means of transporting the captured footage from the camera to the recording unit. Normally coaxial cable is used for this.

3. Recording unit (DVR)
   A Digital Video Recorder (DVR) is the component responsible for receiving the footage transmitted from the camera, recording the footage for review at a later stage, and then ultimately outputting the footage to a monitor for users to view.

4. Power Source
   Both the camera and recording unit require a power source for them to operate. This is normally supplied via a 12V AC/DC power adaptor.
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Why install a CCTV system?

The perception that CCTV systems are very expensive, require specialist installers and are predominately only used by businesses has changed in recent times. CCTV systems have become significantly more affordable and user-friendly and are finding their way into more and more small businesses and homes. Below are some important potential benefits that can be derived when considering adding CCTV to your security system:

- **Visual deterrent** - Although CCTV systems do not offer a physical barrier, they do help discourage intruders and prevent crime from occurring in the first place. Sometimes just seeing a mounted camera is enough to place doubt in an intruder's mind, who may decide to simply move on to an easier target.

- **Evidence** - CCTV systems can be used to obtain evidential quality images and recordings of suspects that may have been involved in criminal activity. CCTV recordings serve as irrefutable evidence in any investigation.

- **Peace of mind** - CCTV systems can provide business and family owners with an increased sense of security and peace of mind. With remote viewing capabilities, installing a CCTV system is not only improving your overall security, but it is an investment in keeping an eye on your employees, family, pets and properties.
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What you should know before purchasing a CCTV system

Looking at the specifications of a CCTV system one finds a lot of terminology and technical information, which, for most people, is difficult to understand. Having a basic knowledge of what all of this terminology means is greatly beneficial when evaluating which CCTV product to purchase. Below is a breakdown of the more important terminology and a short explanation of what it means:

**DVR & associated terminology:**

- **Digital Video Recorder (DVR)**
- **Internal storage**
  - **HDD (Hard Disk Drive)**
- **Network Port**
- **USB Port**
- **BNC - Video Inputs (from cameras)**
- **Audio Output**
- **HDMI + VGA Video Outputs**
- **Audio (microphone) inputs**
- **DC Power Input**
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**Recording unit (DVR)**
A Digital Video Recorder (DVR) is the component responsible for receiving the footage transmitted from the camera, recording the footage for review at a later stage, and then ultimately outputting the footage to a monitor for users to view.

**BNC - Video Inputs**
Depending on the amount of channels the DVR supports, video signals from the camera gets plugged into these ports of the DVR. Normally DVR's can accommodate 4, 8 or 16 cameras (channels).

**Video Outputs**
The HDMI and VGA ports are used to connect the DVR to a monitor or screen to display the footage. Normally the VGA port is used when connecting the DVR to a PC-monitor, and the HDMI port is used when connecting to a High Definition Television (HDTV). HDMI allows display resolution of up to 1080p.

**Audio Inputs and Output**
Some DVR's support recording both video and audio. By placing a microphone in the room as a camera, one is able to record both picture and sounds from that area. Note, there is only one audio output (which can also be plugged into a TV) as one can only listen to one audio recording at a time - playing multiple audio recordings simultaneously results in a garbled mash of sound.
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Power Input
DVR’s normally are never plugged straight into mains (220V) power. DVR’s are supplied with an AC/DC power adaptor that supplies the DVR with regulated 12V DC power.

USB Ports (Universal Serial Bus)
USB ports are used to connect devices, that are compatible, to the DVR. Examples would be a mouse, used to navigate the DVR’s menus, and a USB memory stick, used to back-up recorded footage from the DVR.

Network port (Ethernet)
The Ethernet (network) port is used to connect the DVR to an ADSL router. By doing so it allows the DVR to be connected to an internet connection, which is required for remote viewing.

Internal storage (HDD)
Video signal received from the camera’s need to be stored somewhere on the DVR. A Hard Disk Drive (HDD) is used for this purpose. Depending on the capacity of the HDD and the quality of the recordings, a DVR can store recorded footage for a number of days, or, even weeks. Normally a DVR will automatically over-write the oldest recorded footage when the HDD is full.
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Camera & associated terminology:

- **Lens**
- **Infrared Illuminators**
- **Indoor/Outdoor Bullet Camera**
- **Mounting bracket**
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Indoor/Outdoor Bullet Camera
Camera’s come in a variety of shapes and sizes, including Dome, Bullet and Pinhole cameras, some can only be used for indoor use, and others can be used both inside and outside. Cameras that are suitable for outdoor use must be able to withstand the weather elements. For a user to determine whether a camera is suitable for outdoor use, one can ask for the IP (Ingress Protection) rating of the camera. A minimum rating of IP55 is required for a camera to be used outdoors, although a rating of IP66 is recommended.

Lens
A camera’s lens is very important when considering the type of viewing angle one wants a camera to monitor. A larger diameter lens enables a camera to see further and in greater detail, however at a narrower viewing angle. A 3.6mm diameter lens allows a viewing angle of around 65° and a viewable distance of about 50m.

Infrared Illumination - Used for Night vision
Some camera’s have Infrared LED’s that surround the lens of the camera. At night these Infrared LED’s turn on, not visible to the naked eye (just a faint red glow), which enables the camera to “see” at night or in areas that are not well illuminated. Depending on the strength of the Infrared, a camera can monitor an area, even in complete darkness, to a distance of about 10 - 30m.
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What is 720p? Resolution explained
As technology has progressed, so has the quality of the images a CCTV system can playback and record improved.

CCTV products often have terms such as “CIF”, “D1”, “960H” and “720p” listed under a video quality sub-heading. These terms refer to the video resolution that a DVR can playback and record, the higher the resolution, the better the image quality and the more detail one can see. Have a look at the example on the right, as one moves from CIF to D1 to 960H and eventually 720p, a bigger area can be seen and the image becomes crisper and clearer.

The Yale CCTV system uses HD 720P technology. Ensuring wider surveillance with clearer, sharper and more defined viewing and recording footage day and night.

CIF (240 x 360)  D1 (480 x 720)  960H (480x960)

Viewing angles of older technologies are narrower. Images are more blurry and distorted.

HD 720P  (720x1280)

Easy Fit HD 720P CCTV Technology

High Definition Footage

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Two camera’s are mounted in the same position and are monitoring a room. The camera on the left displays images at 960H and the one on the right at 720p. Looks very similar, but let’s point out three differences showing why 720p is that much better:

1. Compare the people’s bodies and faces, note how the 960H image appears to stretch them out of proportion
2. Look at how much clearer the wooden floor looks in the 720p image
3. Compare the far left of both images - notice how much more is displayed in the 720p image?
What you should know before purchasing a CCTV system

Infrared? Night Vision explained

How are some camera’s able to display an image, even when there is no lighting? Although explaining infrared goes way beyond the scope of this study guide, a capable CCTV camera uses infrared, which is invisible radiant energy, which picks up heat patterns emitted by its immediate surroundings.

Humans, animals and objects all emit different heat patterns, and infrared technology is used by a CCTV camera to differentiate these and ultimately display a picture.

CCTV supplier’s will often claim figures of 10m IR (infrared), 15m IR, 30m IR, etc. All that this means is that the specific camera, using infrared, is able to monitor an area of up to 10 or 15 or 30m from the camera itself in darkness (depending on the number and strength of the infrared LED illuminators installed in the camera).
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Remote Viewing
In simple terms, remote viewing is the ability for one to view your CCTV camera from an offsite location, for example, viewing a camera installed at home from your office. How is this done?

Most DVR’s can be connected to a home network via a network cable and suitable router. Provided that your home router is connected to the internet, one can use this internet connection to stream footage from your CCTV system to another device, such as a smart phone, Tablet or PC.

Using a device such as a Tablet or smart phone requires an APP to be installed which allows the device to connect to the CCTV system. Make sure that the CCTV supplier also has an APP available for download. It is important to note at this point, that although using an APP is normally free of charge, mobile data (internet) will be used by the smart device, as well as data being used by the CCTV system as well. Video streaming can use a lot of data (similar to watching video footage online (e.g. You Tube), so one needs to be mindful of this fact.
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Motion, scheduled or continuous recording?
There are a number of recording options listed on the packaging, including continuous, scheduled and motion recording, what is the difference?

Continuous recording, as the name implies, means that the footage that is recorded/stored from the camera is nonstop, or in other words, the DVR records 24/7.

Scheduled recording, enables a user to set specific time intervals for the DVR to record. For example, the DVR is only set to record from 06:00 to 18:00, any period outside that interval is not recorded.

Motion recording, is ideal for maximising hard drive space. Motion detection areas can be set up, and when movement is detected in a detection zone, the DVR will start recording, stopping when no further movement is picked up. This not only helps in maximising storage space, but it also helps for reviewing recorded footage.

Always consider the environment and the application required, for example, in a retail environment it is advised to use continuous recording, motion recording will not be effective in very busy areas and be careful when using scheduled recordings as unfortunate events do not always stick to a time schedule.
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Frequently asked questions:

- How many camera's can be connected to a DVR?
  This depends on the amount of channels available on that DVR. Normally DVR’s accommodate 4, 8 or 16ch. If in doubt, have a look at the back of the physical product and count the number of BNC video inputs.

- What do I need so that I can remotely view the CCTV system?
  A DVR capable of remote viewing, a router with available ethernet port and ADSL internet connection, and remote viewing APP (if viewed on a smart phone or Tablet).

- Does the DVR stream over the internet continuously (I’m concerned about data usage)?
  No, the DVR will only start streaming when the request comes through from the remote device (smart phone / Tablet).

- How can I avoid a scenario of the DVR recording long periods where nothing is happening in the environment monitored?
  Set up your DVR to record on motion, the DVR will only start recording when movement is detected in the detection zone.

- Why purchase a 720p system and not a D1 or 960H?
  720p resolution offers not only a wider viewing range, but it also facilitates better quality, cleaner and sharper images. 720p is a HD (high definition) resolution and is a newer technology.