

Advantages of a digital CCTV system include:

- * **Tapeless recording**- provides unattended operation and reassurance of continued operation;
 - quality remains consistent and as configured during setup
 - no downtime associated with tape jams
 - significantly longer record periods
 - real-time and immediate search and view (no rewinding tapes, FF, etc.)
 - ongoing operating expense is gone (cost of tapes, labor to maintain, etc.)
 - quick archival of footage onto CD or local file
 - footage reproduced as evidence in police and insurance friendly formats

Components of a typical CCTV system include:

- * **The DVR (Digital Video Recorder)** – storage capacity determined by size of hard drive(s). Number of camera capability determined by number of input cards. Typical configurations are for (4), (8), (12) and (16) camera systems. A (5) camera system requires (2) 4-channel input cards. Includes the computer, hard drives, chassis and CD recorder.
- * **Video cameras** – including indoor and outdoor dome style, box style, covert style, vandal proof and weather proof. Color or black and white. Auto or manual focus. Backlight compensation. Image quality options based on amount of detail desired.
- * **Camera mounting brackets** – include wall mounts, pivoting, flush mounts, etc,
- * **Video monitor** – LCD or CRT. Usually 15” for 4 cameras, 17” for 8 and 19” for 12 to 16. The DVR can feed one monitor. If multiple monitors are needed (i.e. office and lobby) then a VGA distribution amplifier is required and longer additional VGA cables. The DVR feeds the distribution amp (DA) and the DA feeds the main and all auxiliary monitors. Maximum recommended length for VGA monitors connected to the DA is approximately 35 feet.
- * **Power supply** – industrial quality with fused protection and surge suppression for powering basic box and dome cameras. *Outdoor cameras requiring environmental enclosures and heaters with blowers need a larger power supply and are usually wired to a separate wall transformer which can be located near the camera or back at the headend equipment.*
- * **Siamese Cable** – a combo cable with RG-59U coax and 18 gauge 2 conductor for power supply
- * **UPS (Uninterruptible Power Supply)** – this is a battery backup system that the DVR and camera power supply plugs into. It provides instant switchover to battery power in the event of an AC power failure. It also prevents the electronics from damage due to line voltage fluctuations such as spikes and brownouts which occur from weather conditions, electrical current demand on the grid and other variations caused by motors or compressors starting and stopping in an industrial location. These will, depending on specification, operate the system on battery power for up to 30 minutes preventing the loss of video monitoring during power failure. Their intent is not to power the system for long periods of time, but rather to protect the system and avoid momentary loss of data. UPS units are specified by VA (Voltage-Ampere) ratings. Generally, use a 450 VA UPS for up to 8 cameras and a 650 VA unit for 9 to 16 cameras. For sites with very irregular power, more advanced units having AVR (Automatic Voltage Regulation) can be purchased which will supply clean, regulated power to the DVR system.

Remote Access and Client Software:

Standard with all DVR systems provided by Audiomatrix, Inc. is the ability to remotely access the DVR software and monitor video and audio from any PC worldwide that has the client software installed and has the necessary authorization to access the system. This is accomplished via a broadband internet connection (i.e. DSL, Cable, etc.) which must be available at both the DVR site and at the remote location. Simple networking parameters are configured into the DVR by the installing technician and a connection is made via an ethernet cable between the DVR and the customers network (i.e. LAN, internet modem, etc.). The client software is installed by the customer at the remote location from a CD and is relatively self explanatory. A toll free tech support number is provided in the event a customer needs assistance with the installation. It is important that the customer has a broadband connection available at the time of system installation so the DVR can be connected, configured and tested. Additionally, if the connection is present, but not nearby the headend equipment, the installing technician may need to run wire to bring the broadband connection to the DVR (as opposed to using a standard 10 ft. RJ-45 ethernet cable) which may result in added charges for labor.

Once successfully connected, the customer may access the DVR system from the remote location and, based on the DVR configuration, have access to nearly all or none of the features the same as if they were sitting in front of the system. This includes viewing all camera video, listening to any audio (if microphones are a part of the system), searching the archived footage, changing camera angles and zooming in (if appropriate PTZ (**P**an-**T**ilt-**Z**oom) cameras and communications hardware is supplied) and modifying the system parameters (i.e. how the cameras respond to motion recording, quality and resolution of images, fluidity of the video, etc.). Multiple users can be allowed to remotely access the system, each having different levels of permissions.

Video storage capacity:

The DVR system records video directly to an internal hard drive. When the drive becomes full it begins recording over the beginning of the footage previously recorded. The length of time before this occurs is determined by several factors, namely:

1. The size of the hard drive in the DVR (250 gb is the standard in a 4 camera system);
2. The number of cameras connected to the system;
3. The frame rate set for recording an individual camera;
4. The recording configuration (record on motion, motion sensitivity level, record continuous, etc.).
5. Resolution of the image (i.e. 320x240, 640x240, 640x480).

For typical applications desiring moderate quality video with an image size of 320x240, having 8 cameras recording on motion with medium sensitivity at 3 frames per second, the archival period before re-recording begins will be approximately 40 days with a 250 gb drive. As image quality, resolution and frame rates increase, the storage time will be less. If these parameters stay the same but a larger hard drive is installed, storage time will increase.

The DVR is supplied with a video input card that accommodates up to 4 cameras. On a system designed for 8 cameras, the unit will have (2) input cards. Each card handles up to 30 fps (**F**rames **P**er **S**econd) at the lowest vertical resolution (i.e. 240). At either 320x240 or 640 x 240, each camera per input card can be individually adjusted to record anywhere between 1 and 8 fps. If the full resolution of 640x480 is used, each camera can then only be adjusted to record between 1 and 5 fps. The card limit at 640x480 is a maximum of 20 fps.

Common CCTV system failures:

The most common cause of problems in a CCTV system is DVR failure due to **excessive internal heat and poor ventilation**. The heat is caused by the continuous operation of the hard drives running at high RPM as they are recording data. The design of the DVR housing is also critical as it must provide the proper ventilation to exhaust the heat generated by the drives.

Other failures or otherwise poor performance issues can be contributed to;

- poor quality coax cable;
- generic and screw-on style bnc connectors and/or bnc to F adapters;
- low cost cameras and inexpensive lenses;
- improper setup and configuration.

How to ensure reliable performance:

Recognizing the most common causes of system failure and the ways to avoid it, Audiomatrix, Inc. considers a number of factors when designing and installing a commercial CCTV system for our customers. By thoroughly understanding the application from the beginning, the correct components of the system can be assembled to ensure the system operates as required. By utilizing professional grade products designed to work together, the system doesn't experience the typical incompatibilities associated with other CCTV systems that are built from a variety of components all having different specifications. As a result, our system price may appear higher, but the system will function flawlessly, providing the customer with ongoing, reliable video monitoring and recording.

What sets our CCTV system apart from most competitors is the following:

- * A durable, industrial built DVR box with a commercial grade internal power supply
- * Video bandwidth rated hard drives to dissipate and reduce heat build up
- * Expertly designed DVR enclosure to maximize air flow for proper ventilation
- * Dual commercial exhaust fans to keep internal DVR components cool
- * Hi-grade commercial cameras and lenses
- * Professional quality low loss compression BNC connectors on camera end and on DVR
- * Commercial grade Siamese cable
- * Durable, high contrast, brand name video monitors
- * Manufacturer with reliable, proven experience in video surveillance system design (CTG)
- * System software that operates under Windows XP, XP Pro or Linux platforms
- * Feature rich DVR software that is straight forward and easy to use and learn
- * Free technical support for both client and DVR system software and hardware
- * In-house or on-site CCTV system demonstration (what you see is what you get)
- * Knowledge of issues that affect CCTV performance and the ability to recommend options
- * Direct company owned service technicians trained and low voltage licensed
- * Audiomatrix, Inc.'s commitment and installation work ethic

Various camera types:

- Box Color Camera**
 - surface mounted general purpose camera, 380 to 420 TVL
 - general monitoring, 3 to 8 mm vari-focal lens, medium resolution
 - limited detail, reasonable wide angle view
 - standard 1/3 inch CCD imager

- Dome Color Camera**
 - flush mounted general purpose ceiling camera, 380 to 420 TVL
 - general monitoring, 3 to 8 mm vari-focal lens, medium resolution
 - limited detail, reasonable wide angle view
 - standard 1/3 inch CCD imager

- IR Color Camera**
 - surface mounted camera, 380 to 420 TVL
 - for use where light is unavailable
 - IR sensors turn on to record greyscale image in low or no light
 - functions as standard color camera with light available
 - not designed to illuminate large and distant areas
 - ideal for coverage required within 10 to 15 feet in IR mode
 - standard 1/3 inch CCD imager

- Outdoor Camera**
 - surface mounted or dome style camera, 380 to 420 TVL
 - requires environmental housing with heater and blower
 - requires larger power supply, usually separate 1.7 amp supply
 - standard 1/3 inch CCD imager

- Hi-Res Cameras**
 - surface mount or dome style, 480 TVL to 600 TVL
 - higher quality lens required to enhance detail
 - larger lens required for detail at greater distances (7 to 70 mm)
 - 1/3 inch CCD to 1/2 inch CCD
 - significantly higher cost

Typical lens features:

- Backlight** Also known as BLC. A compensation feature for viewing the subject against a bright background (i.e. camera pointing at a door where background becomes very bright when door opened)

- ES** Electronic shutter – auto IRIS. Controls the open/close position of the cameras on board shutter. Not recommended for outdoor use due to large variation in light. Indoor use allows compensation for light fluctuations.

- AGC** Auto gain control – usually has a normal and boosted setting. Attempts to artificially boost the video signal when low light is prevalent. This can tend to cause the image to become grainy under certain circumstances.

- WB** Also WBM and WBA. This is the white balance mode of the camera and can be set manually or automatically. From the correct white point, the camera can more accurately determine what the rest of the colors should look like.