

## DVR Tutorial

Whether you are new to digital video recorders (DVR) or an experienced installer or operator, this tutorial will provide you with valuable and comprehensive information on DVR technology and digital video surveillance systems.

You will quickly learn that all DVR's are not alike. Price, quality and performance vary as widely as there are different user applications.

The object of this tutorial is to make sure the products you buy are suitable for your particular needs and fit your budget accordingly.

In the Beginning...

The DVR originated with mechanical-type devices. They typically were operated by remote controllers and buttons or dials on the DVR box itself. Easy to operate, their functions and keys were similar to a device users were already familiar; the VCR. Unfortunately, due to technological limitations, early DVR's were not reliable, had limited features and offered poor quality video recording. Consumers and businesses desired more capable and reliable systems, which resulted in the introduction of PC-based DVR's. The PC-based DVR brought enhanced features and were programmable, but the early models were plagued by inherent reliability problems. Today, both PC based and non-PC based DVR's are much improved over their early predecessors. Substantial advances in digital video technology and equipment have opened as many doors to users as they present challenges and quality issues for manufacturers.

Many people have the misconception that a PC-Based DVR is merely a PC with a video capture card and some off-the-shelf software. This explains the presence of hundreds if not thousands of DVR and security companies that have literally sprung up overnight. While these companies may hold themselves out to be manufacturers and security specialists - beware - few deliver quality video recording or reliable equipment.

At a recent security industry trade show our company attended there were hundreds of exhibitor booths with DVR's on display. They possessed attractive literature and phenomenal marketing claims. However, they were unable to provide a live demonstration of their equipment or show the features listed in their sales brochures without experiencing significant problems.

A true DVR, meant for security surveillance and mission critical applications, is a sophisticated system composed of specialized hardware, software and sub-assemblies with built-in checks and balances. It all must work in unison to create a robust and reliable piece of equipment.

Building a DVR security solution requires software and hardware engineers, programmers and system designers, plus support personnel.

Do not confuse a professional security DVR with TiVo or other set top type of cable boxes that are also known as DVR's. They are, at best, distant relatives.

Topics for this tutorial

Some of the basic points we will cover here are:

- DVR technology
- DVR myths and realities
- DVR video capture cards
- DVR in a PC environment
- DVR in a non-PC environment
- Peripheral concerns vs. DVR stability
- What you need in DVR software
- Questions to ask when buying a DVR

Unlike a VCR, the DVR has many advanced features and can also be operated and viewed remotely from anywhere in the world using the Internet. A Digital Video Recorder differs from a VCR in several important ways.

Instead of recording video and audio data to a tape, the DVR records to a computer hard drive, removable media such as a CD or DVD, and remote storage/Backup servers. In contrast to video cassette tapes, computer hard drives:

- Are more reliable (no tape jamming, degaussing or signal loss)
- Can store far more recorded material (weeks, months, years)
- Offer better video quality (cassettes wear out the tape)
- Are automated (no need to worry someone forgot to push the record button)

Cassette tapes are bulky, vulnerable to loss of data and have to be replaced frequently. Re-using tapes to save space and cost causes picture quality to degrade. In contrast, rerecorded digital video media loses no quality, while data stored on hard drives can be protected more effectively from loss due to tampering, accidents and operating errors.

Video and audio stored on your DVR can be:

- Accessed quick and efficiently
- Viewed or retrieved locally or remotely across the Internet
- Viewed simultaneously by multiple users
- Tied to alarm systems

There are two major categories of DVR's. One is a PC based and the other, non-PC based or "Embedded" as it is often called. Both offer similar functions and both can be accessed over the Internet.

One of the most frequently asked questions about DVR's is: Do I want a PC-Based or Non PC-Based DVR?

Non-PC based DVR can offer most of the basic features such as recording, Playback, Remote View, and some have CD or DVD Burners, Most companies will only offer 120fps systems with only 120GB Hard Drive this may work for a 4-channel system but they will sell you this configuration with 8 or 16 channels This will compromise your recording quality and recording time. FYI each camera will view 30 frames per second. PC-Based DVR's are, however, expandable. Even if you buy a 4-channel, 120fps DVR you can eventually expand it up to 16-channels 480fps on a single chassis. One thing to note is you can add additional DVR's at a later date and they can all communicate with each other regardless of being on a separate piece of hardware and multiple DVR's can be viewed by a remote PC, Server, or DVR .

This is a good juncture to note when we use the word "*channels*" we refer to camera inputs. Therefore, a 16-channel system accommodates 16 cameras. It does not mean you have to use all of them today but you have that expandability option.

NOTE: Many customers that know they are going to add cameras will usually buy a slightly larger system; meaning if they are going to need an 8 camera system will buy a 16-camera system just to have it there when needed. This is also a good time to note that when you are running the cable for your systems you should always run extra cable for any future plan since its going to be that much cheaper in doing it today while the other work is being performed.

PC-based DVR's that are sold with configurations over 16 channels like a 32 or 64 channel DVR will max out at 480fps and each camera will use the available frame rate:

Ex.

DVR 16 channels at 480fps – each channel can receive 30fps for max quality.

DVR 32 channel at 480fps – IF all channels have equal share then 15fps Quality is cut in half.

DVR 64 channels at 480fps – Do the math  $480\text{fps} / 64\text{channels} = 7.5\text{fps}$  per channel = Poor quality.

PC-based DVR's can also be arranged as fault tolerant enterprise servers (RAID5) which are often required in casino, law enforcement, government and various mission-critical applications. A RAID5 server is a DVR with multiple hard drives and if a single hard drive fails you won't lose your data, unlike a standard PC where if a hard drive fails you lose everything on that drive. RAID5 systems are costly and can increase the costs by as much as three to fivefold. A RAID1 system often referred to as a mirrored system needs a minimum of 2 identical drives to implement this solution. A remote or off site RAID1 system will work for small business that want a fault tolerant solution for a lower cost. DVR-POS.COM also offers event backup services through a high-speed Internet connection.

Non PC-Based, or embedded DVR's, are "fixed" in terms of the number of channels each unit can accommodate. You can add more machines and centrally control them for expansion purposes but you cannot increase the number of channels within a particular machine.

In extreme environments, embedded DVR's adapt better. Traditional PC based components are more sensitive to temperature changes, dust and vibration. Embedded DVR's are more suitable for less protected locations such as motor vehicles, warehouses, manufacturing, restaurants, etc.

DVR's are not all alike. In fact, many are as dislike as, for example, automobiles. In the world of DVR's you can find the equivalent of a \$10,000 Kia and a \$100,000 Mercedes Benz plus everything in between. Both may be capable of getting you from point "A" to point "B" but that's where the similarities often end.

Using the car analogy, if you buy a light weight truck it may be a fine vehicle for hauling small loads. But, if you load it up with 10,000 pounds of cargo and drive up and down hills all day you shouldn't expect a very long useful life out of the transmission or engine. It's not that it's a poor product, rather that's not what it was designed to do. Not unlike exotic and sophisticated foreign cars, many DVR's can be just as complex and temperamental.

Every ounce of computing power is critical. Digital video recording is a process intensive, multi-tasking application which can tax even the most robust systems. Along with processing power a good DVR depends on equally robust related parts and assemblies. The famous saying in information technology is "you are only as fast and efficient as your slowest and weakest component." If your system is not beefed up from end-to-end, from hardware to software, it will be underpowered, will under perform and it's going to break. Even worse, it simply will not deliver any reasonable quality or cause instability from the outset.

This is one of the reasons for the disparity in DVR pricing. It's what's under the hood that you pay for. Unfortunately, there's no official consumer's guide to

DVR's. It's difficult at best for most buyers to evaluate products on a fair comparison, or to even know; what are reasonable expectations.

Hobby and consumer class products often parade as commercial and business grade. Don't be fooled. You can buy a blender for your home for \$25.00 but it is not the same as the \$250.00 model at your local bar which may be responsible for making hundreds of perfect daiquiris and Margaritas every night. Remember, surveillance you are either monitoring or recording 24/7 so that \$25 blender equivalent won't do the job.

Components become even more of an issue as you get into the large systems. Caveat emptor – let the buyer beware – all DVR's are not alike. Watch out for \$1,500 PC's labeled as server grade or enterprise equipment.

For buyers who do not have a lot of experience with DVR's, separating the quality from junk can be a daunting task. Often advertisements for entry-level products will conveniently fail to mention the things that their system will not do. Often the buyer doesn't realize it until:

- The quality of the recorded video is poor or corrupted.
- The recording and display speeds are not as promised.
- The number of days of storage is far less than promised.
- Certain functions only work under limited or ideal conditions and render other features inoperable.
- The DVR overheats
- You just bought a second system from the same company and it doesn't work with the old one because the software or hardware is not compatible
- There is no one – (at least locally) - to support the product.
- You were never given a written warranty on DVR or Installation.
- You can't control the DVR remotely the way you thought.
- You did not receive a Demo of the DVR.

There is no shortage of potential shortcomings of a substandard system or parts. That is if you can get it to work in the first place for any extended period of time. All DVR-POS.COM (RIMS LLC) systems are built just for you by a A+ Certified and Fully IBM Certified Technician.

Each and every component can affect the final result. There are even special hard drives designed for DVR's since an average off-the-shelf hard drive is not architected to be cycling 24-hours a day, 7 days a week. It is not going to last.

Overall, the biggest concern in DVR performance is reliability. Many of the entry-level systems are not meant for mission-critical security, or even the most basic for that matter. Remember in its simplest form, you can go to CompUSA, buy a PC Cam, video capture card and PC and you've built yourself a DVR. But these

are not feasible components for security applications and, there's an additional issue of operating software.

In another analogy, consider video conferencing technology. You can easily operate video on your PC with MSN or AOL for free using a USB camera and microphone. Then why do companies spend ten thousands of dollars on commercial conferencing solutions? Answer, you get what you pay for in quality and reliability.

At the heart of any DVR is the video capture card, also known as a DVR board or card or encoder. This component, more than any other, will determine the effectiveness and quality of your system. The encoder is the "engine" which powers the vehicle. This video capture card contains hardware or software based Codec, which performs the vital operation of capturing, compressing and decompressing packets of video data. Codec, which stands for **compression-decompression,**" will be discussed in greater detail later in this tutorial.

There are consumer quality, economy priced cards and industrial/commercial grade products too. Be suspicious of systems passing off inexpensive video capture cards as professional ones. Most of the inexpensive cards are counterfeit sold at rock bottom prices, when cards go bad or problems start the manufacture will not help you and your trying to contact the company that sold you your DVR "Good Luck". At DVR-POS.COM (RIMS LLC) we use the highest quality authentic equipment and we are located in Albuquerque, NM only installing our systems in New Mexico. "You know where we live"

So what is it then that makes the difference between a top notch product and a substandard one?

First and foremost, quality control, careful assembly, and the right combination of parts to achieve the best performance. In speaking with distributors who offer "economy cards" they experienced as much as a 20-30% reject rate. That was just the DVR card; forget about that number when you factor in software and PC performance problems.

Perhaps the most pressing challenge relating to DVR card performance is bottlenecking.

What is bottlenecking?

Say you have 100 garden hoses connected to each other, 99 of which can pump water at 3 gallons per minute, and one hose somewhere along the line, which can only pump water at 1 gallon per minute. In spite of all your 3 gallon-per-minute hoses, the entire system of hoses will only allow 1 gallon of water per minute to pass through.

The same is true in processing video data. "You're only as fast as your slowest component." Put a bunch of good high-performance components on a DVR board and one component is not matched or as fast as the others and you have a slow, underperforming system.

Building high performance, reliable DVR cards involves the use of quality and often expensive components. This is one area where cutting costs comes at a great expense to speed and quality.

Shared resources refer to the condition that occurs when one computer component is asked to perform multiple tasks simultaneously. Each task a particular component performs drains a portion of that part's total resource and can lead to a reduction in performance or outright failure of the system.

Who hasn't ever experienced their personal computer progressively slowing down or freezing up after opening too many windows or applications?

Beware; often manufacturers will quote a specification for their equipment at its "maximum" performance level, under ideal conditions. This usually assumes the component is doing nothing else at the same time, but rather a single, simple function. Manufacturers will merely show you functions or features as a single task and not demonstrate the same across multiple channels, knowing that the quality or stability is not possible.

DVR's more often than not are called upon to multitask. You want to be able to view, record and playback, multiple simultaneous cameras.

In DVR systems shared resources often result in reduced performance evidenced by slow, choppy, robotic and poor quality recorded images. This may lead to significant instability and eventual failure.

Let's first give you a quick lesson in translation and calculation of video "speed" or "*frame rates.*"

Some manufacturers use different expressions when identifying the speed capabilities of their product. It will become increasingly apparent why this is misleading.

Thirty (30) "frames-per-second"(abbreviated as "fps") is "real-time," "real-motion" in the NTSC (North America) video standard and twenty-five (25) frames per second in the PAL (International) standard. This is not to be confused with "fields-per-second" (also abbreviated as "fps"). Unfortunately, two (2) fields equal one (1) frame. So when a manufacturer states "30 fps" on their literature are they talking fields or frames?

Another acronym used by manufacturers is “ips” (images-per-second). Similar to frames-per-second, there are two (2) images-per-second to each frame-per-second; so two (2) images or two (2) fields equal one (1) frame. Therefore, in order to obtain a real-time, real-motion image you require sixty (60) fields or images per second, per camera.

When comparing a DVR's fields (FPS), images (IPS) or frames-per-second (FPS) display, recording or playback performance claims; be careful to take into consideration all the factors that will apply to your particular application. Once again, manufacturers' claims may be based on “*optimal*” conditions and have little to do with reality and what you are trying to achieve. So always check to see if the total number of FPS/FPS/IPS quoted is for the entire DVR capture card or is it on a per channel basis.

While live motion viewed from recorded images is achieved at 24-30 frames per second depending on the standard. Motion pictures, like those you see in a movie theatre, are recorded at 24 frames-per-second (NTSC). Recording at 24 frames per second versus 30 frames per second will increase your storage capacity proportionately while conserving system resources, but you lose quality. This is actually never a concern on our DVR systems as all our products are capable of recording real-time 30 frames per second on all channels simultaneously. Remember your hard drive is the cheapest component of your DVR so there is no need to skimp on storage space.

This is also though where there is a big difference in quality of DVR's. A professional system when playing back in slow motion or slower speeds will give you precise razor sharp images, while inferior systems cannot stabilize the images. Ever see on the evening news the pictures of the bank holdup. You can see that something happened but good luck trying to figure out who it was and the details.

A file is a collection of data. File size refers to how much data is contained in this single unit of measure. The larger the file size, the more bandwidth (the amount of data that can be transmitted in a fixed amount of time) and computer resources are required to display, record and transfer that file. Conversely, a smaller file, of the same amount of data, will use fewer computing resources, display and record more effectively and will transfer across networks more efficiently.

The size of a file of video data can be affected by image size (resolution), motion, compression and various other factors. Ultimately this can affect the amount of video you will be able to store on your DVR's hard drive and overall performance when viewing and recording multiple cameras simultaneously. As cautioned previously, beware of performance claims; they are usually referring to results achieved under unrealistic conditions.

As a rule, the higher the compression ratio, the smaller the file size. The smaller the file, the less sharp the image but the quicker the transmission speed and the less storage space required. Conversely, a lower compression ratio results in a larger file size, sharper image with a slower transmission speed and more storage space required.

A good way to understand compression is to think of the printer attached to your computer. If you print with a higher resolution the quality is better but it takes longer to print because there are more dots per inch to process and takes time to process and lay down the ink. Using a lower resolution is faster because it has fewer dots per inch or less data, but the image quality is less sharp.

This reverts back to a previous issue of speed claims. When they say your printer prints 20 pages per minute, it's usually not based on the highest resolution or with full pages of ink coverage, but the maximum possible on low resolution with the manufacturer's definition of normal print coverage.

Newer technologies have more efficient ways to compress the data while maintaining image quality. A good DVR solution has the ability to separate display, recording and network transmission functions. Effectively, you should be able to record independently high quality video images while transmitting that same high quality video over a network in a more compressed format, so as not to clog the network and have a smoother viewing image.

Large file sizes bring several interesting challenges for your DVR solution. One primary concern is the majority of DVR users want to be able to watch video when they are away from the home or office, via Internet access. How much bandwidth you have now becomes the concern, due to Internet limitations.

We return to the garden hose analogy. If the garden hose can only accommodate one gallon of water per minute (e.g. your Internet connection) and you are trying to pump water from a source (e.g. the video data stream) which requires 3 gallons per minute we have ourselves a mathematical problem.

The water (video data) backs up (latency). Now let's add to the conundrum, what if you wanted to receive water from another source at the same time (video data from another camera) – the result is the throughput has been further cut. In terms of video what you end up with is chopped up and sometimes frozen images.

So why do we need to understand this stuff?

Ultimately, in order to accurately determine how much hard drive space you will need with your DVR you need to take into consideration the codec technology being implemented, image resolution size, the bit-rate/compression ratio, the amount of video activity and if motion detection (setting the DVR to only record

activity when the camera detects motion in its field of view) is being utilized. Next, calculate the number of cameras and how many frames per second you want to record on each.

Advanced DVR systems, including those offered by DVR-POS.COM (RIMS LLC), will allow you to independently control each channel for:

- image resolution
- bit rate
- display frame rate
- record frame rate
- smart motion detection
- monitor detection

Raw uncompressed video uses a tremendous amount of data. At times we want to transmit and store many simultaneous camera images on a single computer. In order to accomplish this task practically and efficiently the data requires compression before it can be transmitted or recorded.

Compression is performed when an input video stream is analyzed and information that is indiscernible to the viewer is discarded. Each event is then assigned a code – commonly occurring events are assigned a few bits and rare events will have more bits. These steps are commonly called signal analysis, quantization and variable length encoding.

There are 2 types of compression; hardware and software. It is actually a case of compression and decompression. Compress it to condense the data for display, transmission and storage and decompression to view the recorded data/images. When you use hardware compression there is a minimal loss of efficiencies, as all the work is being done on the DVR capture card by hardware components designed for that specific function. That is of course if you have all the right components.

Software compression utilizes software to instruct the computer's processor and memory to perform specific operations. As these operations are very intense, the processor and memory are taxed to their limits and beyond. It becomes further exacerbated when the computer is asked to perform multiple tasks simultaneously and there is just not sufficient power to perform. As the processor is being stressed it generates heat. This leads to concerns of overheating.

This is why we talk time and again about the system being designed to perform the function it is being asked to do. This explains why many DVR's are only capable of performing certain minimal tasks. Meaning, trying to record and display high quality real time images on multiple cameras simultaneously is not going to happen on low-end DVR's running software compression. Many DVR systems on older technologies running

hardware compression are not even capable because the older technology is not designed for the task.

## Codec Comparison

The Codec, which stands for **co**mpression-**dec**ompression,” is a program or algorithm that lies at the heart of the DVR/video capture card. The quality of the codec being run on your video capture card can make or break your system's visual and overall performance. And, not unlike computer processors and other digital technology, codecs have evolved rapidly over a relatively short period of time and continue to evolve and improve as we write these words.

In the information technology (“IT”) world we often speak of 180 days as one lifetime. Think about when you buy a PC - how long is it before the next greatest model is on the market? Every Christmas there is something new and usually at some point in between there are other advancements. Incredibly, some of the codecs being used by DVR manufacturers today are more than a decade old.

### MJPEG

One of the oldest Codecs still in use. MJPEG (Morgan JPEG) is usually found in the least expensive and lowest performance DVR's. While capable of providing decent image quality, MJPEG is inefficient, resource intensive and chews up the hard drive space quickly. It hogs bandwidth which impedes network transmission.

### MPEG2

MPEG2 is a very common codec and has been in widespread use for more than a decade. It has a good reputation as a stable codec and, up until a few years ago, was the choice of most professionals. While smaller in file size than MJPEG it is still larger and more difficult to transmit across networks as newer codecs.

### MPEG-4

MPEG-4 (Part 2) is an object-based compression. In MPEG4, individual objects – rather than a scene of objects - are tracked separately and compressed together to create a data packet. This results in more efficient compression than MPEG2 or MJPEG and it is scalable, from low bit rates to very high. MPEG4 is approximately twice as efficient as MPEG2.

### H.264

Most recently H.264AVC, also known as MPEG-4 Part 10 (Advanced Video Coding), has emerged as the leading codec for commercial video compression technology. Offering still significantly greater compression than its predecessors, H.264 provides up to twice the compression of the current MPEG-4 ASP (Advanced Simple Profile). It also has the best image quality, smallest packet size, provides DVD-quality video and transmits video more efficiently over networks than any of the previous technologies. Unlike the previous codecs it is

able to negotiate rapid complex images and provide razor sharp quality. H.264AVC is the first of what is known as a complex codec.

DVR-POS.COM (RIMS LLC) utilizes the latest industry standard H.264AVC Extended Profile with High Fidelity, which fully optimizes the codec based on Digital Signal Processor (DSP) technology. Display and recording of video and audio are in real-time and fully synchronized in both modes. Video feeds are directly transmitted from the DVR video capture card to the display frame buffer and the compressed stream data is directly sent to the DVR's memory. The transmission process doesn't need any intervention from the DVR's CPU, greatly saving resources. The results are flawless razor sharp images and sound regardless of how many channels are being monitored or reviewed.

On all DVR-POS.COM (RIMS LLC) DVR Systems you have the choice to use any of the above Codecs.

DVR-POS.COM (RIMS LLC) solution features Oggvorbis audio equivalent to MP3 quality. Compared to prior generations of MPEG4 and MPEG2 technologies, H.264AVC video quality and performance is significantly better. Even with its higher quality video the H.264AVC file packet size is at least 25% smaller than MPEG4 and 50% smaller than MPEG2 and profoundly smaller than MJPEG.

In contrast with 11-year-old MPEG2 and 7-year-old MPEG4 standards which were developed for TV and entertainment, the H.264 codec used by DVR-POS.COM (RIMS LLC) was designed with commercial security as one of its applications in mind.

One of the problems of the older MPEG formats is their inability to properly record fast moving objects. When objects are moving quickly DVR's with older Codecs have a tendency to record blurred or distorted images, including mosaic patterns as you may observe sometimes on digital television broadcasts. While a scene or image is being processed, the next scene follows in sequence. As a result, there is latency, even if in milliseconds, due to time required to compress and decompress the images.

Fast moving objects such as cars, people running, roulette wheels in a casino, etc. present a formidable challenge for digital video recorders. In order to efficiently negotiate transition from one frame to the next the codec needs a way to identify and predict what is happening in the coming scene. "Simple" codecs do not have the ability to compensate or predict resulting in blurred or unusable images.

Even when dealing with normal moving images older codecs do not record high quality video as it requires too much in the way of system resources.

We have watched in casino environments where a number of things happen that frustrate the security people. They are unable to distinguish the denomination of a bill, the number of a playing card or the dice. Then they attempt to playback video in slow motion to look for sleight of hand, only to get blurred or skipping images. Freezing a frame brings further challenges as they appear to have 2 balls instead of one on the roulette wheel or 3 or 4 dice instead of 2. This phenomenon is not unique to the casino industry.

DVR-POS.COM (RIMS LLC) offers MPEG 2 hardware compression board specially designed for applications that require the highest recording resolution and quality offered today. It can give 720 x 480 resolution, full-D1 at DVD quality and 30fps of recording for each camera as well as greatly reduce the CPU usage for more stable PC performance. It's an excellent accessory option for many applications including Casinos, Banks, Art Galleries, etc whose emphasis is on clear video evidence.

Many times you will see demonstrations of DVR products and may think they are adequate. What you may find out later is that they maxed out the resources of the system to provide you with one decent quality "live" image. When you take home the system you find out that it cannot record at a high quality or when you try to record across multiple channels the quality fades.

If this is the case then why haven't the old well-known names in security moved over to the newer technology? First, it's important to understand that only a few years ago the CCTV business was strictly analog. It was simply connect a camera to a monitor, VCR or switch. These companies were ill equipped to deal in the information technology age. A transformation had to occur. These old time companies were accustomed to bringing to market a product in two-plus years, which is equal to 4-plus lifetimes in the Information Technology ("IT") business, as 180 days is a typical lifecycle in IT. Between the old methods and the lack of understanding of the newest technologies they have been slow to adopt. Further, being large organizations they are slow to adapt, especially when it is something foreign to them.

How experienced is the company in the IT field? Are they fully certified, licensed to work on your DVR or Installation of your DVR? Do they have integration experience needed to integrate your system to your alarm system, Point of Sale System, Entry Control Systems or any other requirement you may have?

The owner of DVR-POS.COM (RIMS LLC) has over 16years experience in IT and Security service, installation, project management and integration. Providing the full solution, others only can offer pieces.

We started out by saying some people consider a DVR, a PC with a video capture card and some special software.

There are PC's that cost a few hundred dollars, and there are enterprise grade computer servers that cost over \$15,000. Hardware components are the engines that drive the DVR as a whole. This is the one place you need horsepower in the form of PCI Bus, processor, memory, storage and speed.

Being deficient in any one area brings us back to bottlenecking - once again, you are only as fast as your slowest component.

So if you think a DVR card in a low-end PC is going to perform well – then, think twice. Good systems cost money.

DVR-POS.COM researches and tests DVR components to make sure that our machines provide reliable and efficient operation – day in and day out. We use the finest, high performance components, from hard drives, to mother boards, to encoders and processors to ensure that the system works at peak, real-world performance, not just under ideal demo conditions.

You can buy DVR's, even with H264AVC cards, for less – but you get what you pay for. Unfortunately, with most security applications, DVR failures can have catastrophic results. What's the point of having an image of a criminal act that is too distorted to result in prosecution?

In addition to the main DVR server software (software that resides on the DVR) and client software (software you load on a PC at home or a remote location and then connect to the DVR across a network or the Internet), there are also a number of additional software programs that need to run in the background to give the DVR its reliability and stability.

With the billions of dollars that Microsoft has, why isn't their software foolproof? Why are there always updates and patches? The answer is, no software is flawless and every time something new is introduced, there are bound to be new challenges. How you go about handling these problems is important.

Running diagnostic software, which constantly monitors several different functions of the hardware and software of both the DVR and server are essential. If the diagnostic detects any deviations from the established baseline criteria, it should automatically attempt to correct itself and notify the system administrator it has detected a problem.

Other important tools are:

### **PC remote and VSM “Vital Sign Monitor”**

Remote connection to your DVR and event-alert text messages service software which allows you or a technician to monitor system performance and diagnose

and repair any potential problem remotely. This will save on unnecessary service calls to the DVR's physical location.

### ***Control Center***

Provides the security service department with one point of control to all the networked DVR-Systems and I/O devices. It features remote DVR configuration, matrix view, remote ViewLog, I/O Central Panel, and Remote Desktop.

### ***Central Monitoring***

The DVR-Central Monitoring Station is an extremely powerful and cost effective central station solution that can efficiently manage multiple DVR-System servers from one point of control.

### ***Dispatch Server***

The DVR-Dispatch Server utilizes load-balancing technique to distribute the network load between online and offline Central Monitoring servers, allowing requests from up to 25,000 DVR-Systems to be evenly distributed across maximal 500 DVR Central Monitoring servers.

All these programs and features are standard in all DVR-POS.COM (RIMS LLC). Much of the typical run-of-the-mill products on the market are very basic in nature and not capable of any advanced diagnostics.

In order for you to connect to your DVR across the Internet from a remote location you need to know the IP address of the location where your DVR is installed.

An IP address is a set of 4 groups of numbers (e.g. = 240.47.268.5) which are assigned to you by your Internet Service Provider (ISP). It is through this number that your ISP or other users in a network can connect to your computer. Think of it as a telephone number of the location where your DVR or computer resides.

There are 2 types of IP addresses: static and dynamic. A static IP address is one that remains the same and never changes. A dynamic IP is one that changes continuously. It is fairly simple to always make contact with your DVR if you have a static IP address. Most cable, DSL, and satellite providers, either do not offer static IP addresses or they come with a hefty price tag for their service. If your DVR connects to the Internet through a cable modem or DSL, chances are you have a dynamic IP address.

Unfortunately, dynamic IP addresses are subject to change frequently and without warning. Your ISP typically leases dynamic IP addresses from a pool managed by an outside organization. The lease is only guaranteed for a few

days, at which time that number may go back into a pool to be reused. Also, during the off hours, most ISPs run tests, updates, or make changes to their systems, which may cause your cable/DSL modem to restart. Often, along with the modem restart comes the changing of the IP address.

So what if you have a dynamic IP address?

Think of having a telephone number that changes every few days. The only way people can contact you is if you call them each time to give them your new phone number. It is not practical, to say the least. Even more absurd is that you won't even know when the number is changing.

Therefore, in order to connect to your DVR from a remote location (via the Internet) you will need to know the IP address of the DVR at that time. For example, you are away from your DVR location and want to access your security system and view your cameras, but you don't know your current IP address, or its been changed. You could call somebody at the DVR location and try to instruct them how to figure out what the new IP address is, but that's not always practical and can be a real problem in an emergency.

Fortunately, some DVR manufacturers provide a valuable service to their customers, that eliminate the need to look up your machine's IP address and provides you with easy, reliable remote access to your system. This is called Dynamic IP Updating Service and is facilitated through the use of a Domain Name Server or "DNS". Recently free DNS services have popped up on the Internet. The problem is the updating is not in real time. So if the service does not update when needed you are out of luck.

DNS is transparent to the user. Each time your DVR connects to the Internet it communicates directly to the DNS server which is sort of like a switchboard - for member users, only. Then when you connect to your machine from a remote location, you dial actually into the DNS and it patches you through to your DVR. You use the same address all the time, the DNS does all the translation and routing so that you connect every time regardless of changes in the DVR's IP address.

With a DVR System from DVR-POS.COM (RIMS LLC) you don't have to worry about assigning IP or DNS Services. Our systems can manage dynamic IP's automatically or configure a static IP through your Routing equipment.

PPPoE, which stands for Point to Point Protocol over Ethernet, is an important issue for users who connect to the Internet using DSL service.

When your DVR logs into the Internet via a DSL connection you may be required to enter a user ID and password before transmitting data.

If your DVR restarts, which can happen periodically, in case of power problems or operating system issues you will have to log in again. But if you're not at your location, who is going to log you back in? Without automated login software you will be cut off from your security system. Fortunately, all DVR-POS.COM (RIMS LLC) DVR's come with software that will instruct your machine to automatically log back into your ISP or network connection.

Our industry has zero tolerance for failure, especially in light of the events of the past few years such as 9/11, Columbine High and a host of other public catastrophes. There is nothing wrong with following the lead of others, but there could be a price to pay for taking a shot with an unproven product or entity.

Before you invest in a DVR security solution, make sure you ask the right questions.

- If there is a problem who do you call?
- What are the qualifications of the people selling it to you?
- How long does it take to get service?
- What experience does the reseller have with this product?
- How long have they been in business?
- What hours can you get service?
- Where are the service centers located?
- If the seller is a distributor and not the manufacturer, what happens if they no longer carry your product?
- If the seller or manufacturer is only buying parts and assembling products, what guarantee do you have that you will get support if their suppliers disappear?
- What will happen if this company is no longer around 6 months from now?

When purchasing a DVR system, you are not just buying a machine, you are also buying a company and the people behind it.

Today's security surveillance DVR's are an Information Technology (IT) product. These are high tech, complex, mission critical systems that require professional support and service. Even if you never experience problems with your equipment,

you will likely need to ask questions, upgrade, reconfigure or customize your equipment or system at some time in the future.

The security industry today is characterized by a large number of companies, many of which were in this business long before the current, high-tech digital security systems were introduced. Some companies have adapted well, while others hold onto obsolete technologies either because they are unable to adopt or have invested too much in older generation equipment. Companies that were experts in older analog CCTV technologies may not have “core” competency in today's sophisticated network devices.

Additionally, there are numerous start-up companies holding themselves out to be DVR manufacturers and touting the latest and greatest technology. Common sense says beware of performance claims and that price and quality often go together. Again, it takes years to develop reliable systems. Companies that also tout proprietary codecs also is a joke as it takes millions of hours to develop codecs, which are brought about by consortiums of companies globally working in unison.

We hope this tutorial has given you a good working knowledge of DVR systems so that you can make better, more informed decisions about the products and suppliers for your security system needs.

What products do I need for a typical installation?

#### Hardware

- DVR (with keyboard, mouse, connectors)
- Monitor
- Cameras
- Camera Lenses
- Camera Brackets
- Cameras Housing (if necessary)
- Rack Cabinet (optional)
- Printer (optional)

#### Electrical / Fittings / Connections

- Video Cable
- Power Cable
- Audio Cable (if using mic.)
- BNC Connectors (if using coax cable)
- Video Baluns (if using Cat5 cable)
- Power Supplies (if not using power panels)
- Power Panels (if not using power supplies)
- Fuses (if using power panels)

- Power Strip
- Power Cord
- Uninterruptible Power Supply (UPS)
- Surge Protection
- Conduit
- Screws / Bolts / Brackets
- Tie Wraps
- Electrical Tape

#### Optional Accessories

- Hot Swappable Drives
- CCTV Monitors
- Text Inserter
- Speakers
- Microphones
- Relays
- Thermostats
- Alarm Bell / Horns
- Alarm Light
- Access Control Devices
- RAID Storage
- IR Remote Control
- I/O IN/Out Device
- Real Time Display Cards
- Data Converters
- Network Router
- Multiplexers / Quads / Switches

**Call us to evaluate your Surveillance DVR needs  
or  
To schedule your DEMO**

**Roland Dominguez - 505-610-8240**

**E-Mail: [sales@dvr-pos.com](mailto:sales@dvr-pos.com)**

**Records and Information Management Solutions LLC**

**WEB: [DVR-POS.COM](http://DVR-POS.COM)**