

Tech Note - 10

Surveillance Systems that Work!™



System Frame Rate

Live Monitoring vs. Recorded Video

After considerable recent dialogue with a quality supplier of video surveillance equipment, we're compelled to use our Tech Note forum as a means of defining an important in the video surveillance industry – namely, “What’s Important, Live (monitor) or Recorded Video?”

Background

On one side of the debate there are those who claim the industry should strive to provide the highest quality live video possible. On the other side are those who believe that unless the application requires precise monitoring of live video it is more prudent to invest one's surveillance system capital on components that matter.

We have no problem stating our position up front – 99% of video surveillance system end users have no need for much of today's “high-definition” video monitors – who's primary purpose is to provide extremely precise LIVE VIDEO MONITORING. The balance of this paper explains why.

Economics

Each year, thousands of dollars are invested – both at the R&D level as well as on the consumer purchasing level – in pursuit of higher resolution video monitors. These units maximize LIVE video performance of today's high-resolution analog and MegaPixel IP cameras. That, as a give, one must ask the question, “Is live monitoring important in my application?” Our answer (for the majority of clients – excluding casinos, banks and other highly sensitive to what's happening right now customers) is an emphatic, “No! The aspect of critical importance (in the majority of video surveillance applications) is being able to accurately identify events in RECORDED video.”

Since recorded video is most important – for the majority of surveillance video applications - system RECORDING resolution (recording frame rate) and specific camera recording frame rate should be the primary consideration of every prospective DVR purchase.

Combination of Analog and Digital

Generally speaking, today's digital video surveillance systems are a combination of analog electronics and digital electronics. A majority of today's Closed Circuit Television (CCTV) cameras produce analog signals that are transmitted via coaxial cable to a Digital Video Recorder (DVR).

Once the analog signal (a continuously modulating voltage or current) reaches the DVR, it is translated (digitized) into a digital signal (a fixed string of data represented by 1's and 0's) by circuitry called an analog to digital (A to D) converter.

Digital Video Recording

Once “digitized,” each frame of video is compared against the previous frame to determine if it’s changed (i.e. something new has entered the picture) and a decision is made to record or discard the data. If the image has changed it’s recorded (the digital data is saved to a computer hard drive) and if it has not changed (all the bits and bytes are the same) the digital data is discarded.

In addition to being digitized, before being stored on the computer hard disk, the digital information is further processed (unnecessary items that do not adversely affect the image) are discarded so file size can be reduced and hard drive storage space can be conserved. This portion of video processing is called compression and is defined by a variety of different codecs (mathematical algorithms that are employed to differentiate between what is necessary and what is not).

Hopefully, so we can go on to understanding frame rate, we have not lost a majority of our readers with the above (very difficult to write) explanation. The last couple of paragraphs can be summarized as follows; In order to conserve hard drive storage space, stored video images are different (they contain less information) than when they were originally generated by the camera.

Understanding Frame Rate

The rate at which digital electronics process information is directly proportional to their economics – faster devices (those that create more data in a given period of time) are more expensive than slower devices. As such DVR manufacturers – competing for the best product at the lowest cost build equipment that produces varying recording frame rates.

For example, because economics always affects customer-buying decisions, 16-channel DVR’s are available with total system frame rates that vary from 60 to 480 total recording frames per second designs. The system frame rate defines how many video frames the unit is capable of recording in a given period of time. System video recorded with too little frame rate will appear as motion that “jerks” from point to point.

System Frame Rate vs. Individual Camera Frame Rate

If a DVR with a system recording frame rate of 240 fps is used to record ten (10) cameras simultaneously, on average, each camera will be recorded at 24 frames per second. Conversely the same ten cameras on a system with only a 120 fps capability would be recorded with only twelve (12) frames per second. The higher frame rate recording DVR will appear to provide better or smoother video. Additionally, if one were looking at individual frames of fast motion – such as a head turning from side to side – the higher frame rate machine would provide twice as many images from which to choose the precise image of interest.

Since only a single camera’s recorded video is typically of interest at any given point in time, even though DVR providers rate their equipment in terms of “system frame rate,” the most important specification is an individual camera’s recording frame rate.

Conclusions

- Unless your surveillance application requires very detailed analysis of live streaming video (i.e. you employ people to monitor live camera viewed activity or events) you would be better to invest your surveillance system dollar on higher recording frame rate equipment than you would expensive video monitors,
- Given that most applications are interested in monitoring (reviewing) recorded video, recording frame rate specifications are far more important than live video frame rate specifications,
- System recorded frame rate is and important consideration but per camera recorded frame rate is most important.

For additional details on this subject, please contact your local GuardDog Surveillance Systems Representative.

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