Explore Pages: **Surveillance and Smart Video**	Author: **Alfredo Troche**
Date of this version: **8/9/20**	Version #1

Storage Solutions for Surveillance and Smart Video

Surveillance is everywhere.Cameras are on and recording footage at almost every traffic light, parking lot, subway station and freeway. Smart video is capturing daily activity in businesses, public areas, and secure institutions like hospitals, federal buildings, banks and more. Recording24 hours a day, seven days a week. In the past, surveillance was a focused solely on gathering security footage, and reviewing past events. Today, surveillance has evolved. It'sentering a new era of technological advancement with smart video. Data collected can be used and analyzed to transform industries and vertical markets to ultimately improve people's lives.

Surveillance is watching while everyone is asleep. It's becoming the eyes and ears that never tire, recording footage non-stop to ensure safety and security. Maintaining a surveillance system used to be an expensive proposition - usually reserved for small to large businesses. Now, with the advent of digital and wireless technologies, sophisticated smart video and surveillance systems are affordable and accessible to the home user.

Surveillance is big business, too. In fact, it is one of the fastest growing data storage markets today, achieving an average annual 12% growth*. Western Digital answers this growing need with a specialized line of professional-level HDD and microSD storage solutions designed especially for the demanding task of always-on surveillance. Our products cover a full spectrum - from flash cards and embedded devices in cameras, to enterprise-class HDDs and SSDs and storage boxes for the back-end and cloud.

Let's take a look at how video surveillance has evolved. It has become more efficient and accurate, produce sharper footage, and has the ability to expand capacity while becoming more affordable for home and small business users. Smart video is making our lives safer and more secure into the future.

*source: Business Solutions (*https://www.bsminfo.com/doc/video-surveillance-growth-set-to-exceed-percent-0001*)

Understanding Surveillance Systems

Most stand-alone surveillance systems are comprised of three main components:

- **Video recorder** – referred to as a Digital Video Recorder (DVR) or Networked Video Recorder(NVR), this device is the 'brains' of the system and interprets footage received from the cameras to data recorded to an internal hard drive, or array of drives. An enclosure that houses a processor, video inputs, and an internal storage HDD. Like the DVR you use at home to record TV shows, except this device records security footage.
- **Internal storage** – often a hard disk drive (HDD) or SSD, in a single-bay or multiple bay configuration. These drives hold all the footage captured by the cameras in a continuous stream, or at a schedule set by the administrator. High capacity drives are preferred because they hold more continuous footage with less overwriting of data.
- **Cameras** – either wired or wireless, cameras are the sensors that collect video footage and transmit it directly to the recorder in real time. Available in standard and high definition resolutions, these are the essentials 'eyes' of the system, and are strategically placed to

provide maximum field of vision in sensitive areas. Cameras can be monitored individually via the NVR's user interface.

Video Recorder

Surveillance recorders fall into two main categories: DVR and NVR. Consider these points when making your choice:

DVR Advantages	**NVR Advantages**
Hard-wired, no internet hackers	Highly scalable; just add IP cameras to the network
Great as internal stand-alone system	Wireless cameras can be used to ease installation where wire runs are difficult
Generally lower cost	
DVR Disadvantages	**NVR Disadvantages**
More difficult to install and expand	Can be prone to internet hackers
May not support higher resolutions	May be inaccessible when internet is down

Some older, complex, DVR systems required an elaborate visual interface with monitors for each attached camera. Today, most systems offer a wireless smartphone or tablet interface via a proprietary app, which give the user full control, even when remote from the DVR or NVR via the internet.

Consider an all-in-one solution like WD ReadyView – available in four and eight camera configurations.

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On-Board Storage

You wouldn't try to haul a piano with a tricycle. You would use a vehicle that could accommodate the intense load of a piano easily. The same is true with surveillance. This 24/7 task demands storage designed to keep up with the always-on, 24/7 surveillance workload.

Standard desktop drives are built to run for short intervals, and are not typically designed for the 24/7, always-on environment of a surveillance system. Any disruption in surveillance could result in a failure that impacts multiple users, a failure to record a security event, or even degrade the entire system.

System has a pre-installed hard drive that is low capacity	Consider upgrading the internal storage to a higher capacity
System has no pre-installed drives	Install surveillance-grade drives with high capacity
Multi-bay system with vacant bays	Add more drives as capacity demands grow

The amount of security footage recorded and saved on the internal hard drive depends on several factors:

- How many cameras are simultaneously recording?
- What resolution and framerate the cameras are using?
- How much continuous uninterrupted footage is required?

The table below gives an example of approximate hard drive capacity used during continuous recording:

- One camera recording
- H.264 encoding
- 30 frames per second at various resolutions

Resolution (pixels)	7 Days	14 Days	30 Days	60 Days	90 days
720p (1280x720)	330 GB	660 GB	1.2 TB	2.5 TB	3.7 TB
1080p (1920x1080)	400 GB	800 GB	1.7 TB	3.4 TB	5.1 TB
4K (3840 x 2160)	1.2 TB	2.5 TB	5.3 TB	10.5 TB	15.8 TB

WD Purple™ Surveillance Hard Drives

For home and small business security systems, Western Digital offers WD Purple™ surveillance hard drives. These drives are specifically designed for continuous surveillance and smart video tasks. WD Purple drives are engineered for always-on DVR and NVR systems. They're able to withstand the extreme heat fluctuations and equipment vibrations within an NVR environment. WD Purple drives are also optimized for writing multiple concurrent video streams simultaneously, which makes them a suited for surveillance and smart video applications.

- WD Purple hard drives have three times the workload rate of standard desktop drives*. They're tuned for write-intensive, high stream-count applications typical to most surveillance systems. They have a supported workload rate of up to 180 TB/yr.
- Built-in IntelliSeek™ technology reduces damaging ambient noise and vibrations.
- WD Purple drives are equipped with AllFrame 4K™ technology. These drives improve ATA streaming to help reduce frame loss, improve overall video playback.
- WD Purple 8TB, 10TB, 12TB & 14TB drives have additional capabilities to support Deep Learning analytics in AI capable NVRs, and feature an enhanced workload rating of up to 360TB/yr.

** Workload Rate is defined as the amount of user data transferred to or from the hard drive. Comparison is based on annualized Workload Rate (TB transferred ×(8760 / recorded power-on hours)). Workload Rate will vary depending on your hardware and software components and configurations.*

Consider equipping or upgrading your DVR or NVR with WD Purple Surveillance Hard Drives.

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Cameras

Cameras are the eyes and ears of your security system. They can make a big difference regarding the quality and integrity of your captured footage. There are basically two types of surveillance cameras: Wired and wireless – consider these points when choosing:

Wired Camera Advantages	**Wireless Camera Advantages**
More secure, can support higher transmission rates	Ease of installation in locations where wire runs are difficult
Leverage existing IP network, if available within reach	Greater flexibility in installation location, so long as within range of Wi-Fi access point
Wired Camera Disadvantages	**Wireless Camera Disadvantages**
Requires cable-run, which might be difficult in some locations	May be prone to internet hackers
Power over Ethernet (PoE) cameras may lose power if the network goes down	Wi-Fi interference or weak signal could result in loss of critical video capture, without on-board storage

Cameras are mounted at usually high angles pointed out and downward to capture the maximum field of vision important to the user. Multiple cameras are deployed depending on the need and capacity of the DVR or NVR. Some support four cameras, others up to eight, and high-end NVRs can support up to 256 cameras in a single system.

- Modern surveillance cameras connect to an NVR directly via ethernet cables. In some cases can power the camera, as well as POE (Power Over Ethernet) and provide approximately 30 watts of power, which is sufficient for most cameras
- Wi-Fi enabled cameras operate on your LAN (Local Area Network) and transmit their signal wirelessly to the NVR. However, these cameras can require a separate power source if not connected via an ethernet cable to the NVR
- Many surveillance cameras are installed in inaccessible locations, making serving and supporting these cameras more difficult and requiring more robust design and long-lasting components such as storage technology
- Cameras can capture footage at various resolutions – depending on your requirements and storage limitations.
- Infrared technology (if available on your camera) is utilized to capture footage at night or during low light conditions
- Most newer cameras can zoom in or out and rotate angles via remote control

WD Purple™ Surveillance microSD Cards

Most of today's state-of-the-art IP surveillance cameras have capabilities for capture and protection of data using on-camera microSD storage. While ordinary microSD cards can provide a measure of protection, the Western Digital WD Purple microSD card has the endurance, capacity, and weather-resistance to provide not just protection, but an extra measure of confidence that your captures are uninterrupted should internet go down.

- WD Purple MicroSD cards are designed for continuous 24/7 recording, in the event your camera loses connection with the NVR, and provides additional confidence in your video surveillance system

- All WD Purple microSD cards feature increased endurance, which is critical for long-lasting, reliable and continuous operation in cameras that are in inaccessible locations
- In compatible cameras, WD Purple MicroSD card's health monitoring capability allows you to check card health status, so you can perform preemptive storage maintenance when necessary
- WD Purple MicroSD card supports a -25°C to 85°C temperature range, and it is humidity-resistant. This card is designed for continuous operation in extreme weather conditions and in a variety of climates.

Consider equipping or upgrading your IP Cameras with WD Purple microSD Cards

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Capturing and Organizing Footage

Once you have set up your surveillance system, it's time to start capturing footage. There are two ways to do this – continuous monitoring or motion-triggered:

- **Continuous monitoring** means your video capture remains on at all times and records every minute of footage to the DVR or NVR. This can eat up capacity quickly on your NVR, so make sure you have a big enough hard drive(s) installed in your recorder to accommodate as much footage as you require.
- **Motion-triggered** provided your camera can detect motion (most newer ones do).You can set capture to happen only when the camera detects motion in its field of vision. Some systems allow you to manage 'hot spots' for video triggering; when movement is detected in a hot spot, it automatically triggers recording.

Surveillance footage is captured on to the internal hard drive as long as there is space to do so.Once maximum capacity is reached, the NVR will start rewriting the disk from the beginning, erasing any previously recorded footage as it continues. To avoid losing captured footage you can either:

- Swap out the internal drive with a fresh, blank, formatted drive
- Expand your capacity by adding more drives (if you have available bays in your system)
- Backup the old footage and erase or overwrite the drive with new recordings

Backing up your footage on a regular basis to a separate device is crucial to maintaining a reliable archive of your captured surveillance. A WD My Book™ is an ideal device to perform this task. Tip: Choose a model that exceeds the capacity of the drive you are backing up.

Shop our complete line of desktop storage solutions ideal for backing up your DVR or NVR – like WD My Book.

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Monitoring Your System

Many modern surveillance systems allow you to monitor your system remotely via a smart app on your PC, smartphone, or tablet. They eliminate the need for an elaborate array of onsite CRT monitors and other attached equipment.

Look for a surveillance system that includes a software interface that will allow you to view live video streams just about anywhere in the world with internet access.

Remote mobile video surveillance allows you to view multiple cameras simultaneously, control settings, view recorded images, search through archived footage, play back events, and more. Remote video surveillance is ideal for business owners to keep tabs on their property while away, and for home users who are traveling or away from home.

NAS as a Surveillance System

If you already own a NAS (Network Attached Storage) device, you may be able to configure it to also record your video surveillance footage. Most NAS manufacturers include surveillance software to perform these tasks and require Wi-Fi enabled IP cameras to transmit a wireless signal to the NAS. You can commit the whole, or part of the NAS storage pool solely to this function. Some advantages to this method include:

- Real-time 24/7 access to cameras recording footage
- The ability to use the NAS as both traditional NAS and NVR, eliminating the need for a separate, stand-alone NVR
- The ability to access archived footage without interrupting ongoing live recordings
- Alert notifications on your PC, smartphone, and tablet via SMS, email and desktop notifications
- Customizable data retention policies that will let you overwrite old data after a certain time period to enable uninterrupted video capture

Check with the NAS manufacturer to see if your NAS supports video surveillance. Western Digital manufactures a wide array of NAS enclosures that support video surveillance.

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Smart Video – The Future of Surveillance

Smart Video is the evolution of traditional surveillance. Data collected by cameras can be leveraged by smart apps like facial recognition. Smart Video uses cameras to analyze incoming video in real time to extract valuable insights that allow decisions to be made without human intervention. That's how you can unlock your phone with your face and doesn't require you to enter any data manually. Advanced consumer surveillance systems have already incorporated facial recognition algorithms to their systems, allowing users to be defined with a quick scan.

Another example of Smart Video is smart cities. Smart cities use different types of electronic Internet of Things (IoT) sensors and devices to operate municipal cameras, control signal lights, reduce congestion and pollution, and improve people's lives. Insights gained from that data are used to manage assets, resources and services more efficiently. When collected information is pooled

together, it's referred to a big data, which can then be used to improve the operations across the smart city.

In Smart Factories, Smart Video can detect manufacturing inefficiencies, and in some cases, perform better quality control. In Smart Retail, analyzing foot traffic can help identify prime locations for product promotion and placement.

So, how does Smart Video work? Smart Video employs Artificial Intelligence (AI), either in the NVR or on the camera. AI requires deep learning and that can take place in the NVR or more likely, in a deep learning server on the back-end or cloud. Deep learning requires massive amounts of reference video data sets to continuously create more effective and efficient AI.

Smart Video can impact every aspect of surveillance. It impacts everything from cameras, to recorders, to back-end servers. Consider that more effective AI requires higher resolution video, higher frame rates, and more visual detail. All this leads to the need for more and more reliable data storage.

Shop our array of enterprise-class storage solutions like Ultrastar and WD Gold data center drives.

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