

# Network Video Recorders

White Paper  
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## Abstract

As digital video recording capabilities improve, the systems that control cameras and store video have lagged behind. Fortunately, new hardware solutions designed specifically for the latest generation of powerful IP cameras help organizations stream, store, manage, control, search and archive video. They're called Network Video Recorders or NVRs. These systems are designed to connect dozens of cameras while providing centralized access and management both locally and via the Internet.

New, user-friendly software interfaces make the systems easy to install, configure and operate with a simple Web browser. Now users can centrally and/or remotely monitor and record from cameras that reside in locations all over the world. Live video streams and stored video are accessible via desktop, PDA or mobile phone. D-Link partners with the leading NVR providers and offers a full line of IP cameras. This white paper describes the new opportunities available to organizations that deploy NVRs, the technology involved, and the features typical in modern NVR solutions.

## What is an NVR?

A Network Video Recorder (NVR) is a centralized, networked recorder solution that connects multiple IP cameras simultaneously. It's essentially a networked server and storage solution that's designed specifically for network video applications and IP cameras (although analog cameras can be included). The technology uses open IP standards, so connectivity, compatibility and flexibility are easy. These are IP-connected devices that aggregate IP cameras.

NVRs allow you to view, control, and record video from all your cameras via one centralized interface. The interface is Web-connected, so you can view, manipulate and manage the video from any IP connected device, including desktops, wireless PDAs, cell phones and so forth.

## Network Video Challenges

Some organizations utilize Digital Video Recorder (DVR) technology – similar to TiVo and home DVRs – to record and store digital images from IP cameras. These are stand-alone boxes that typically include a hard drive and low-level OS that manages stored files and playback. DVRs present several difficulties because of their isolated, non-networked architecture. For one, DVR storage capacity depletes quickly since they usually contain one hard drive. Sometimes limited DVR capacity forces users to record on the OS portion of the drive, which increases disk failure risk. DVR disks often fail because of extensive use, and back-up schemes are not considered robust or reliable. In instances when live recordings are critical, video can be irretrievably lost due to disk failure. The cameras connected to the DVR remain out of service for the length of the downtime, as well. Traditional analog surveillance, with in-person camera monitoring and live feeds, is time consuming and costly. Monitoring staff often lose focus and miss details after only 20 minutes of screen viewing. The process is boring, especially when personnel must monitor multiple monitors. Tape storage and physical back-up procedures can be costly, as well.

The basic problem underlying these shortcomings is that very few DVR systems include redundant components or Redundant Array of Independent Disk (RAID) back-up capability. Without storage flexibility and reliable back-up, confidence in the system is reduced significantly. With DVRs, some organizations end up reducing image quality to extend storage capacity. Frame rates and resolution settings are lowered to meet retention requirements, for example.

Poor image quality then limits the capability of the system. Many new security and business applications – including evidence gathering, face and license plate recognition, and alert/alarm event field definition – rely on good video to operate effectively. Poor image quality and unreliable storage capability undermine the features of these applications.

## NVR is the Solution

NVRs solve the issues mentioned above while delivering unprecedented video recording and management benefits. With an NVR, you can record and remotely access live video streams and stored video files from dozens (even hundreds) of distributed IP cameras. Since NVRs are IP based, they can be managed remotely via your LAN, VPN or secure Internet connection. Robust CPU and memory caching enable jitter-free, smooth video transmission, and RAID technology ensures reliable, redundant back-up. The devices offer a secure, scalable, reliable and flexible integrated alternative to DVR technology. A wide range of IP camera and NVR hardware options exist, so large enterprises as well as SMEs can easily create flexible systems to adapt to specific needs and settings.

### Key NVR Benefits

- Scalability – Correctly architected IP infrastructures can support an unlimited number of installations, cameras and users.
- Compatibility – IP cameras utilize open networking and imaging standards, making them compatible with all kinds of different camera and networking equipment. There is no proprietary system. Buyers can mix and match manufacturer equipment, and use existing IP-based hardware.
- Reliability – IP cameras and NVR server hardware have been proven in countless scenarios worldwide (both indoor and out, and in harsh and temperate climates).
- Flexible Remote Access – NVR technology allows users to access video from any location at any time with a simple Web browser, laptop, PDA or cell phone.
- Maximized Disk utilization – Motion detection settings, event detection, and recording schedules enable economized disk utilization.
- Flexible Add-on – As user and camera installation needs increase, you can incrementally add cameras, clients and NVR servers.
- Future-Proof – IP equipment will be around for decades to come. Enhancements to open standards and IP equipment will only increase the value of your installation as time goes on.

## Common NVR and IP Camera Applications

NVR technology can be used for a wide range of video surveillance applications, including the following:

- Casinos
- Day care
- Prisons
- Homeland security
- Military installations
- Stadiums and arenas
- Large retail/shopping malls
- Schools and university campuses
- ATM machine locations
- Parking lots

- Traffic and roadways
- Tourism venues
- Medical facilities
- Construction sites
- Government offices
- Laboratories

### Typical NVR Features

Onboard NVR software typically features flexible recording and playback capabilities, user-friendly GUIs for management and configuration, motion detection software, alarm and alert functions, and Pan/Tilt/Zoom (PTZ) camera control. Internal RAID disks deliver anywhere from 400GB to 1TB+ of storage. Hard drives are hot-swappable by field technicians.

The video server portion of the hardware enables multiple remote users to securely access all cameras via one IP address. This simplifies access, enabling users to connect to cameras using any device that supports HTTP (using a standard Web browser without plug-ins). The centralized video server enables IT staff to control user access and privileges, as well.

While recording speeds are typically set at 30 frames per second, some NVR units offer 480 fps for super high quality video. Image resolution and fps depend on the IP cameras that are used.

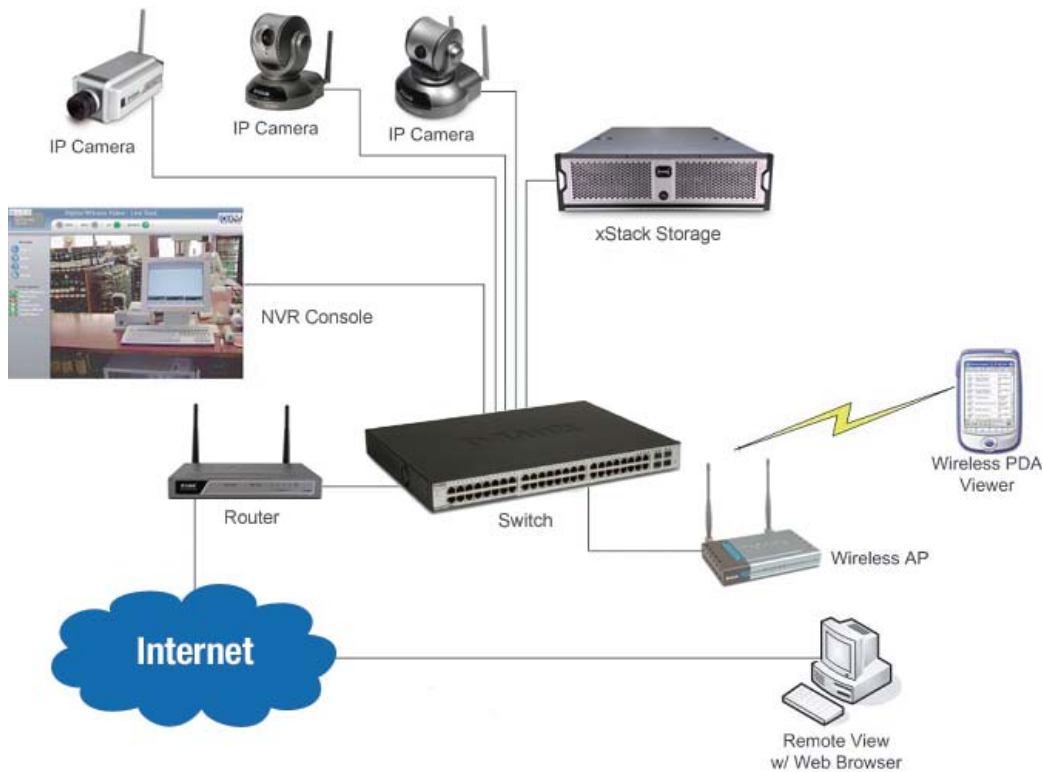
**Other typical features include:**

- Alarms and alerts (via cell phone, pager, browser, desktop pop-up)
- Recording scheduling
- Complete system and event log database
- 3GPP support (mobile phone access)
- Multiple monitor support
- Remote access for configuration, user administration, video backup, live viewing and file search
- Support for different IP camera manufacturers

NVRs also feature integrated digital video enhancement that enables manipulation of the capabilities of the IP cameras connected to the system. Users can also adjust settings to detect motion or frame events and record only when necessary. This saves valuable disk space.

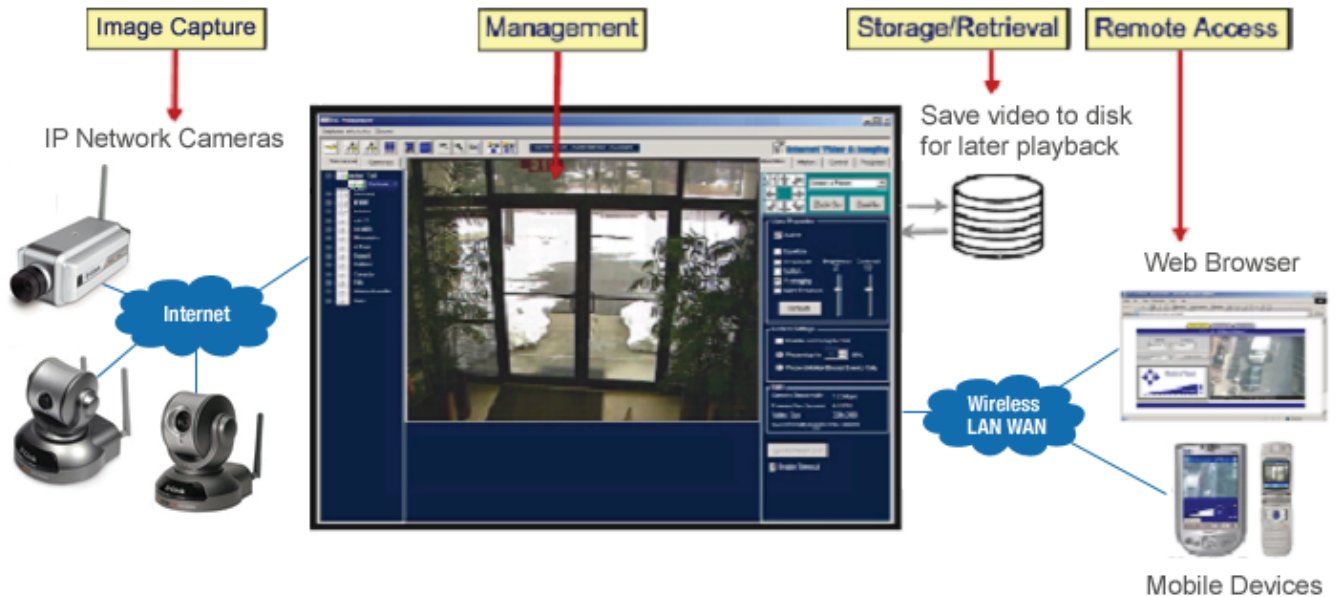
### Mobile Access

Mobile NVR applications allow users to view and control live IP network cameras from cell phones, Pocket PCs, Smartphones and similar Web-enabled devices. Users can access live or recorded feeds, search the archives for specific video files, control live PTZ, save snapshots, digitally zoom in on objects, enhance video, and receive alerts when specific motion-detection or frame field events occur. All that's needed is a wireless connection.



*NVR solutions allow users to view, control, manage, digitally enhance, and record video over the Internet with a web-enabled mobile device, eliminating the need to connect to each IP camera individually.*

## NVR System Overview



*NVR system overview shows each camera's recording can be saved to disk for later playback and accessed remotely.*

### D-Link Solutions

D-Link's comprehensive line of IP cameras, switches, storage and Wireless Access Points (APs) offers organizations a wide range of choices when designing NVR solutions. All models are IP-based, so set-up, management, and upgrading tasks can be handled by any IT staff competent with IP infrastructure. We also maintain strategic partnerships with NVR solution providers, systems integrators and consulting resources.

For more information about D-Link products that support NVR solutions, please visit <http://www.dlink.com/products/> or call 1-800-326-1688.