

# Bosch IP Network Video

An introduction to IP technology  
and the future of CCTV




**BOSCH**  
Invented for life



A detailed image of a Mars rover, likely a Curiosity rover, on the surface of Mars. The rover is a six-wheeled vehicle with a complex structure, including a mast with various instruments and a large antenna. The background is a vast, reddish-brown desert landscape under a hazy sky. A semi-transparent blue rectangular box is overlaid on the left side of the image, containing white text.

IP Network Video –  
the next generation of CCTV



Changes in CCTV technology have been driven by three main requirements. The first is the need to reduce the cost of recording and storing video for long periods. The second is the need to reduce the amount of space required by these systems. And the third is the need for improved accessibility.

Great leaps in technology are made one small step at a time. Bosch IP Network Video takes you step by step into the future of CCTV.

VCRs were the first – and for many years, only – CCTV option. Affordable and reliable, VCRs are also labor-intensive, requiring someone to switch tapes, clean recording heads and perform scheduled maintenance. And the thousands of videotapes generated not only caused storage problems, but were a security risk as well. Anyone could view or alter them, and there was no existing backup.

Digital video recorders (DVRs) revolutionized the industry by eliminating bulky videotapes and placing archives of video at your fingertips. No more costly maintenance or tedious tape switching. Searching became instant and reliable. And while DVRs still require a switcher to funnel video into the operations station, as technology improves, so do video size and storage devices.

Network video recorders (NVRs) using IP Network Video are the third generation – the next step in this evolution of more cost-effective and space-efficient solutions for viewing and storing video. IP-based digital encoders push encoded video onto the network for storage anywhere. This has opened the door to the process of converting analog video to digital, storing it in one place, and viewing it from anywhere in the world.

As with any technology advancement, some users will be ready to make the jump to IP immediately, while others will prefer to transition over time. Because Bosch IP Network Video products are compatible with existing analog components, the transition can be effected gradually, allowing you to take advantage of the benefits of IP video while continuing to make profitable use of your analog investment. Or, you have the option of installing a complete IP system all at once for instant access to the latest CCTV technology.

IP Network Video systems offer a number of advantages over traditional analog systems. Convenience, cost effectiveness and overall efficiency of the CCTV system all play a part in the decision to make the change to IP.

## The advantages of IP Network Video

### **Accessibility**

As the market strives to reduce the amount of staff needed to operate security systems, IP networks allow further centralization. A single operator can monitor remote and wireless cameras from anywhere on the network, and the video can be stored remotely as well. And while many competitors offer point-to-point wireless capability, Bosch allows wireless access anywhere on the network.

### **Simplified installation at lower costs**

Rather than requiring extensive coax cabling like analog systems, IP Network Video systems connect through CAT-5 or wireless communication systems that already exist in many buildings.

### **Reduced storage costs**

When CCTV video moves into the networked world, it allows you to take advantage of IT technologies like network attached storage and storage area networks, which can hold huge amounts of data. The system is using dedicated high-density storage servers rather than relying on a single hard drive. The video on those servers can then be shared with anyone anywhere on the network.

### **Reliability**

IP uses the benefits of Internet technology to create a more reliable security system. It can automatically redirect video traffic to a backup storage system in the event of a power failure or network outage.

### **Scalability**

IP networks offer improved flexibility for enlarging a CCTV system. It is not only easy to add cameras, but also to add storage space and distribute it across the network. Plus, IP networks are uniquely able to support multiple viewers. In the same way that an e-mail server can send the same data to multiple people at the same time, the network switch has the ability to clone the video and use the same data multiple times.

### **Video quality**

Modern IP systems use MPEG-4, which makes more efficient use of the network than M-JPEG. For times when lower quality would be sufficient and would help control the amount of storage used, IP gives you the ability to customize the quality of the video output based on your viewing needs and storage capacity.





With IP, a single operator can monitor remote and wireless cameras anywhere on the network.

M-JPEG

MPEG-4

IP Network Video systems using MPEG-4 deliver higher-quality video than M-JPEG for the same amount of bandwidth.

Bosch can help you make a smooth, efficient transition from your current system to IP capability. We now offer a complete line of IP Network Video products for video and audio streaming, recording, playback and archiving. Our IP Network Video products are unique because we offer the option of having storage within the encoder devices. This capability bridges the gap between DVRs and IP video, as well as offering other specific advantages.

## Trust Bosch for your IP Network Video solution





Bosch's VIDEOS Video Management System allows you to switch cameras on your PC monitor or bank of analog monitors. Bosch's patent-pending ANR technology ensures uninterrupted surveillance and recording, even through network failures.



The pre-alarm recording feature captures important information leading up to an event without wasting valuable recording space.

### Reliable CCTV – even through network failures

Only Bosch can offer you the reliability of its patent-pending Automatic Network Replenishment (ANR) technology. ANR allows local storage in the encoder to act as backup if the network goes down. Conventional NVRs experience recording gaps during network failures, but Bosch's NVR uses ANR to automatically replenish those gaps. It even staggers the information relay to the NVR so the network doesn't get overloaded.

### Audio capability – listen in

Options are available with one- or two-way audio. Bosch enables video and audio to be relayed as a single media stream so the two are synchronized.

### Pre-alarm recording – capture the lead-up to major events

Bosch encoders can temporarily record video of key security locations; then, if and when an alarm is activated, they will rewind and permanently record the information just before and just after the alarm. The relevant video is safely stored on the secure server, but valuable space isn't wasted with hours of uneventful recording.

### Video management systems – bridging PC and analog viewing

Bosch encoders can temporarily record video. The best CCTV systems enable users to view video via both PC and analog monitors. The Bosch VIDEOS Video Management System provides a single means to control both, the most efficient way to manage video information in an IP network CCTV system.

Bosch IP Network Video products are ideal for a wide range of security applications, especially those with numerous remote cameras spread over a large area. Highway management, transportation, correctional facilities, government, university and business campuses and large retail stores are just a few applications suited to a gradual conversion to IP technology. Based on your needs, Bosch products can be used to build complete digital networks or to migrate from analog to digital one piece at a time.

The ideal IP Network Video system would offer the highest quality video and audio sent from cameras located at every conceivable point, viewable from anywhere in the world with an unlimited amount of long-term storage. The reality is that every system is limited by two finite resources: network bandwidth and disk storage. Bosch's goal in developing IP Network Video solutions is to use these limited resources to maximum advantage, giving you the most cost-effective and space-efficient CCTV system possible. Some key benefits of Bosch IP Network Video products help achieve this goal.

## Bosch tools for better resource management

### Video and audio compression

The evolution of compression formats is an unending process – from MPEG-1 on S-VHS to MPEG-2 for DVD, then MPEG-4 for Internet streaming. Bosch video IP encoders are field upgradeable, so if a better compression format is discovered, you have access without investing in new hardware. Our current technology relies on MPEG-2 and MPEG-4 rather than MJPEG to achieve better efficiency. Specifically, MPEG-4 stores only designated keyframes and then the difference between subsequent frames. So if the view of a hallway remains unchanged for hours, the scene and any changes in it are captured using a minimum of storage. And the number of keyframes is fully configurable according to specific user needs.

### Dual streaming

Bosch encoders offer dual streaming capability. Depending on the model chosen, users can adjust frame rate, compression standard and/or resolution to control the quality of the video for different purposes simultaneously – from local viewing to satellite viewing, Internet viewing or archiving. The result is the ability to control frame rates and resolution for each video stream.

### Built-in motion detection

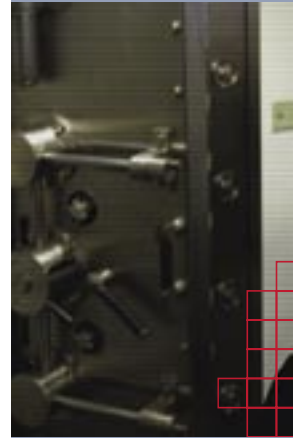
Motion detection through an IP encoder is typically used to raise an alarm to the operator, increase the frame rate of the recording to capture the event in more detail, and cause the alarm video to be safely stored either locally or on a distant NVR. Bosch motion detection is even more sophisticated, allowing you to designate the specific direction of motion that would trigger the alarm as well as how much motion needs to happen. The result is that as little information as possible is sent across the network and stored when nothing is happening, but as soon as an event occurs, it is captured in great detail.

### Multicasting

IP network technology enables the network switch to automatically clone data if multiple recipients want to view the same thing. The proper switch allows multiple viewers to see the same camera over an LAN or WAN without stressing the single encoder. This is a vital component to a scalable solution.

### Bandwidth throttling

Even dedicated CCTV networks can get crowded periodically. With Bosch, users can choose how to adjust to accommodate temporary traffic surges. The frame rate can drop temporarily while the sharpness of each image is maintained, or, conversely, the same number of frames can be recorded but at a lower resolution. Each encoder can also be programmed so that the bandwidth it uses is allowed to rise and fall as necessary to preserve both the frame rate and resolution. Or the user can fix a maximum threshold to ensure that even if every encoder on the network became active, the system would still not exceed the total bandwidth allocation. Bosch provides the flexibility to choose which option is best for a particular application.

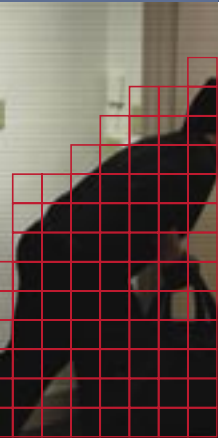


Sophisticated built-in motion detection allows the user to set parameters to maximize both surveillance capability and network efficiency.



The most efficient security systems are those in which all aspects can communicate. But to do this, they need to speak the same language. IP technology is this common language. With an IP-based system, customers can mix and match best-of-breed solutions for intrusion and access systems as well as CCTV cameras – all of which are making the transition to IP. In the near future, security products will communicate predominantly through IP. But until then, Bosch is helping you make the transition by leveraging this new technology rather than embedding it in every product at once.

## The impact of IP on security technology



### Audio

Like Internet radio, IP allows the transmission of audio over enormous distances. And because it's digital, not analog, the sound quality doesn't degrade over long distances. Once archived, it can be played back over and over without degradation. Most importantly, there's no need to run separate microphone or speaker wires from the camera to the observer. It's all done over the ethernet.

### Alarms

Alarm triggers can be generated by an amazing range of products, including contacts, sensors and other systems. But now, instead of being translated from voltage across two wires, they have become bits of information that can be received and handled anywhere on the network – even by multiple recipients.

### Relays

Central monitoring sites simply can't afford to have dedicated wires running to and from every location and device that needs to be controlled. IP technology allows the operator to switch anything on and off and control it from anywhere in the world.

### Serial ports

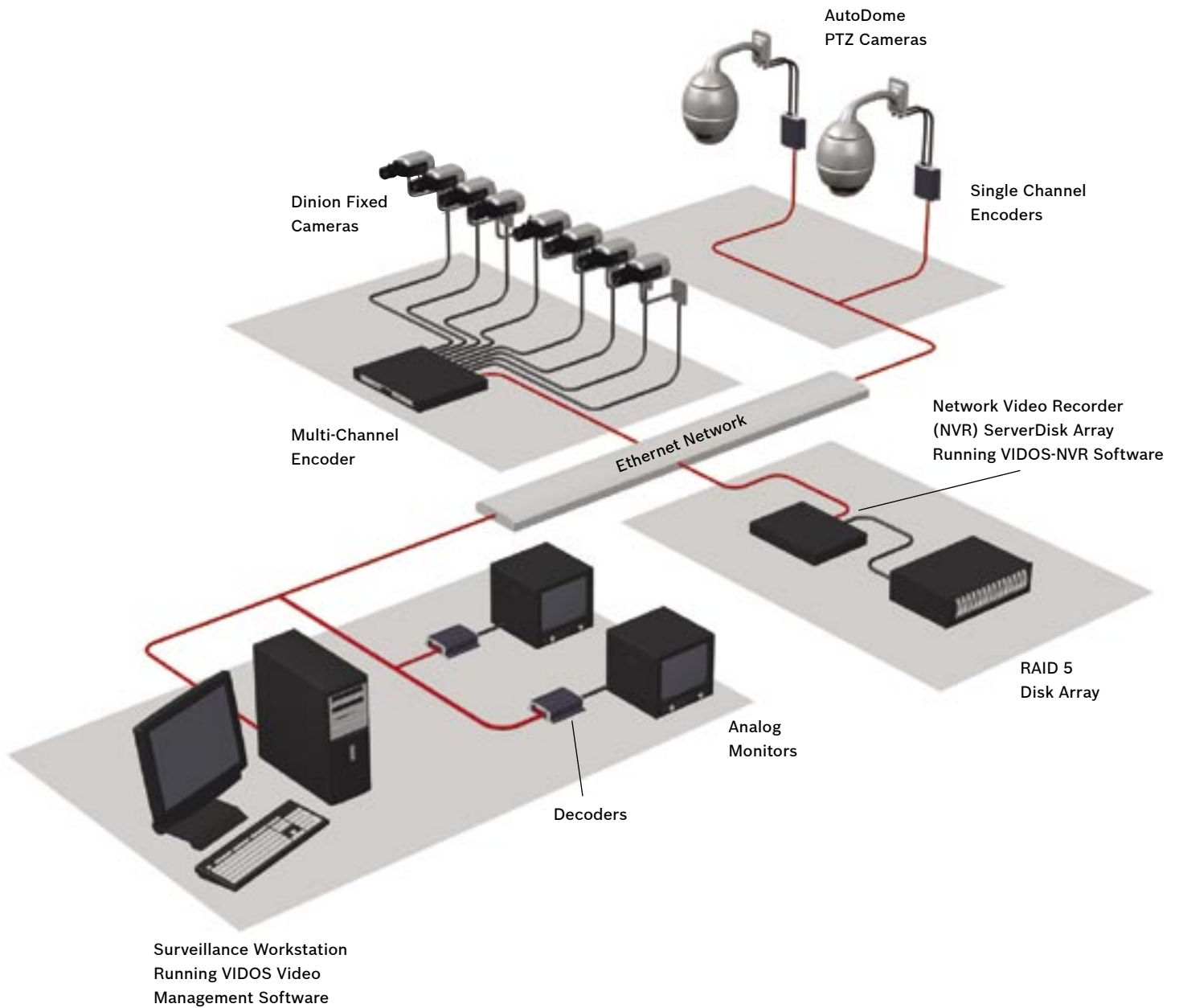
The average serial cable becomes unreliable after the first 3 to 4 meters. But by converting the serial data to IP, the same data can be moved across the planet and in both directions. In CCTV applications, this is particularly important to the reliable operation of PTZ cameras over long distances.

### Wireless

Advances in wireless technologies have been fueled by the demand for increased mobility and ease of installation. IP enabled products instantly leverage this trend without requiring any change in their technology. Where is this technology headed? Imagine walking around with a single wireless tablet and viewing any camera on your network. Or instantly installing cameras along tunnels and bridges without any cabling except power. The technology is moving quickly. The future is not distant.



IP Network Video takes full advantage of advances in wireless technology for increased mobility and ease of installation.



## Typical Bosch IP Network CCTV Configuration

IP technology is here and its influence will only continue to grow. Taking advantage of IP Network Video when installing a new system or upgrading an existing system will ultimately increase the accessibility and efficiency of your CCTV system. By integrating seamlessly with existing analog products and networks, Bosch IP Network Video products can take your CCTV system into the next generation.

Take the first step with Bosch

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