WHITE PAPER

Upgrading Analog Video Surveillance System with IP Technology

Panasonic Video surveillance systems
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1. Introduction

With the increasing concern over better protection of people and assets, security departments are required a higher level of security than before: proactive prevention, earlier detection, a better situational awareness, a quicker identification, a prompter action and more. It is essential to conduct surveillance in a well-planned manner, give security staff good training, and ensure good communication between all related parties. Video surveillance has also become essential. Now many organizations are continually reevaluating and enhancing their video surveillance system to provide optimal daily security and operational efficiency.

If you are considering the enhancement of your analog video surveillance system, upgrading the analog system with the latest IP technology is a good way to raise the effectiveness and efficiency. A well-designed update plan avoids extra cost and unwanted troubles, protecting past investment to the analog system. This paper provides guidelines for a successful upgrade and migration to future-proof IP video surveillance system for Panasonic and non-Panasonic analog system users.

2. The benefit of IP Technology

2.1 Market trend

Technology drives business success more than ever before. Open standard-based IP and High Definition (HD) video technologies definitely have had a greatest positive impact on the video surveillance system. Analog system was good and now IP system is winning.

![Comparison of quantity forecast between analog and IP security cameras (Global)](image)

2.2 Analog video surveillance system

First, let’s see a difference between analog and IP systems. The figures on the next page show typical analog system diagrams. The indoor/outdoor analog cameras, analog monitors and Digital Video Recorders (DVRs) are connected each other through an analog matrix switcher that switches video inputs to monitor outputs. Most DVRs for small system have the switching func-
tion as well as recording function. A lot of coaxial cablings are required to connect analog equipment. Analog video surveillance systems are simple, while they have a very limited functionality and expandability.

2.3 IP Video surveillance system

IP system diagrams are similar to IP-based data networks such as a corporate network and Internet. All equipment such as indoor/outdoor IP cameras is connected by Ethernet (LAN) cables. An IP Matrix Server or Video Management System (VMS) manages the whole system. IP video surveillance system can be easily networked with other sites, mobile devices and other systems such as a face recognition system. In a small installation, most Network Video Recorders (NVRs) have some of IP matrix server/VMS functions. The IP video surveillance systems are open, feature-rich, flexible, scalable and easy-to-use.
2.4 Benefits of IP Video surveillance

IP video surveillance systems bring countless benefits such as exceptional image quality, advanced Intelligent Video, remote and mobile monitoring, flexible and scalable system and saving of Total Cost of Ownership (TCO).

- Exceptional image quality
  Clear live and recorded images enable security staff to quickly identify suspicious individuals, objects and movements and take an action on the problem. While most analog cameras offer approximate 0.3 megapixel resolution, Full HD IP cameras provide over 2 megapixel resolution, resulting in superb image quality. The latest 4K IP cameras offer astounding 8 megapixel resolution. With the wide angle view, IP cameras reduce the blind areas efficiently. The 360-degree IP cameras capture all-around view of the surrounding area, delivering clear de-warped and panoramic images.

- Advanced Intelligent Video
  Intelligent Video helps security staff detect suspicious individuals, objects and movements quickly, automatically analyzing the video stream and extracting useful information from images such as detected intruders. Furthermore, the IP system provides a new possibility to change the video data to a gold mine for business. Customer behavior is recorded on the video and contains valuable information for improving marketing effectiveness, store operations, building layout designs, traffic patterns and more. The IP system enables analyzing a large amount of video data, resulting in the findings that increase your business effectiveness.

- Remote and mobile monitoring
  The IP network is a fundamental infrastructure for every business and organization today. The IP video surveillance system enables monitoring of your properties from anywhere on the IP network through a PC on the remote sites, smartphone and tablet.

- Flexible and scalable system
  The IP video surveillance system is easy to expand, add new functionalities such as audio monitoring and integrate with other systems when the need arises. Open standard-based IP system means you are never locked in to proprietary technology, reducing the technology obsolescence risk.

- Saving of Total Cost of Ownership (TCO)
  TCO is a way of assessing the complete cost including initial acquisition, maintenance, repairs, training and other costs. The IP system provides superior performance and advanced features at lower TCO brought by easy installation and maintenance.
3. Upgrade strategies

You have two options: one-time migration and step-by-step upgrade. Both strategies offer their own advantages and disadvantages.

3.3 One-time migration

All analog equipment is removed and a new IP system is put in at one time. By deploying the new IP system at one time, all features of the IP video surveillance are available immediately. One-time migration is a simple way, while it has a financial difficulty especially in medium and large installations.

**Advantages:**
- Simple upgrade process
- Lower total cost compared to step-to-step upgrade
- Avoidance of problems that result from coexisting of analog and IP systems

**Disadvantages:**
- Financial difficulty for initial investment to purchase and install all IP equipment at once.
- Loss on disposal of the analog equipment that is still available
- Downtime till the new IP system starts (Duration depends on a installation plan)

3.4 Step-by-step upgrade

Step-by-step upgrade takes a gradual approach that allows you to enhance the existing analog system at your own pace. It starts deploying IP equipment from where needed, based on the feature and functionality requirements. Running analog and IP system during transition period, the video surveillance system ends up a full-IP system. This scenario enables starting small according to your surveillance requirements, easing the financial burden on the initial investment to IP equipment.
Advantages:
✓ Enhancement at your own pace
✓ Short downtime during migration
✓ Effective use of the existing analog equipment
✓ Ease of the financial burden on the initial investment to IP equipment

Disadvantages:
✓ Potential problems that result from coexisting of analog and IP systems
✓ Expenses for migration equipment such as video decoders

4. Step-by-step upgrade plan

Panasonic provides optimal upgrade plans for not only Panasonic analog system users but also non-Panasonic users. This chapter is organized to provide specific guides to each user type. Please refer to the appropriate section for your installation.

4.1 Matrix Switcher users (Medium and large system)
4.2 DVR users (Small system)
4.3 Panasonic Matrix Switcher users
4.4 Panasonic DVR users
4.1 Matrix Switcher users

This upgrade plan is suitable for all medium and large analog systems, leveraging an analog matrix switcher that medium and large systems have. The plan enables smooth migration by starting small from where necessary, easing the financial problem on the initial investment to IP system. When your system has a Panasonic analog Matrix Switcher and Digital Video Recorders (DVRs), please refer to section 4.3 for more smooth migration.

Phase 1 – Analysis and design

IP migration begins with analyzing of security requirements, deciding of a project goal, designing of the blueprint of a target IP system and developing a deployment plan.

Phase 2 – First deployment

As the core of the new IP video surveillance system, an IP Matrix Server with Network Video Recorders (NVRs) or a Video Management System (VMS) is installed. New IP cameras and monitor PCs are deployed where necessary. By connecting the analog Matrix Switcher to the new IP Matrix Server or VMS through Video Decoders which convert analog video signal to IP video signal, both analog and IP cameras can be viewed from the monitor PCs.

At this phase,
✓ Both analog and IP cameras are viewed on the monitor PCs.
✓ Surveillance staff can use advanced IP system’s features from the monitor PCs.
✓ The analog cameras still are controlled by the analog controller.
Phase 3 – Gradual expansion
Once video is networked, the IP cameras, NVRs, monitor PCs, and networking with remote sites or mobile devices can be introduced at a pace that makes sense for your requirements.

Sometimes, the need for continuing use of the analog cable infrastructure arises, because of the past huge investment for the cabling, limitation of the pipe shaft, or distance between the IP camera and operation center, etc. Panasonic Coaxial-LAN converter offers IP transmission over the existing coaxial cables.

Phase 4 – Full IP system
The system ends up full IP system, when the IP system has taken over the analog system and the analog system and video encoders are cleaned up.
4.2 DVR users

Even a small system can take a step-by-step approach. This approach allows you to introduce advanced IP features and functionalities, protecting the past investment to analog cameras. When your system has a Panasonic Digital Video Recorders (DVRs), please refer to section 4.4 for simpler migration.

Phase 1 – Analysis and design
IP migration begins with analyzing of security requirements, deciding of project goal, designing of the blueprint of the target IP system and developing a deployment plan.

Phase 2 – First deployment
The DVR and analog monitors are replaced by a Network Video Recorder (NVR) with a HD monitor or monitor PC. Both analog and IP cameras are viewed and recorded through Video Decoders which convert analog video signal to IP video signal.

At this phase,
✓ Both analog and IP cameras are viewed on the monitor PCs.
✓ Surveillance staff can use advanced IP system’s features on the monitor PCs.

Phase 3 – Full IP system
The system ends up full IP system, when the IP system has taken over the analog system and the analog system and video encoders are cleaned up.
4.3 Panasonic Matrix Switcher users

When your system has a Panasonic Matrix Switcher and DVR, IP migration becomes simpler and more cost-effective. The close analog and IP integration provides surveillance staff with easy operation, enabling managing both analog and IP systems just from the IP side. Equipped with built-in encoder, Panasonic DVRs save the migration costs, eliminating the needs to purchase video encoders.

Phase 1 – Analysis and design
IP migration begins with analyzing of security requirements, deciding of project goal, designing of the blueprint of the target IP system and developing a deployment plan.

Phase 2 – First deployment
As the core of the new IP video surveillance system, a Panasonic IP Matrix Server with Network Video Recorders (NVRs) is installed. The IP cameras, monitor PCs and Digital Video Recorders (DVRs) are introduced according to your migration plan. By close analog and IP integration between Panasonic Matrix Switcher, DVR and IP Matrix Server, analog system comes under the control of new IP system.

At this phase,
✓ Both analog and IP cameras are viewed and controlled on the monitor PCs.
✓ Surveillance staff can use advanced IP system’s features on the monitor PCs.
**Phase 3 – Gradual expansion**

Once video is networked, the IP cameras, NVRs, monitor PCs, and networking with remote sites or mobile devices can be deployed at a pace that makes sense for your requirements.

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**Phase 4 – Full IP system**

The system ends up full IP system, when the IP system has taken over the analog system and the analog system and video encoders are cleaned up.
4.4 Panasonic DVR users

When your system has a Panasonic DVR, IP migration becomes more cost-effective. Equipped with built-in encoder, Panasonic DVRs save the migration costs, eliminating the needs to purchase video encoders.

Phase 1 – Analysis and design
IP migration begins with analyzing of security requirements, deciding of project goal, designing of the blueprint of the target IP system and developing a deployment plan.

Phase 2 – First deployment
The DVR and analog monitors are replaced by a Network Video Recorder (NVR) with monitor PC. Both analog and IP cameras are viewed on the monitor PC.

At this phase,
- Both analog and IP cameras are viewed on the monitor PCs.
- Surveillance staff can use advanced IP system’s features on the monitor PCs.
- The analog camera footage is recorded on the NVR.

Phase 3 – Full IP system
When all analog cameras are replaced by IP cameras, the DVR is cleaned up.
5. Equipment supporting IP migration

5.1 Video Encoder

Video Encoders enable integration with your existing analog system and new IP system, converting analog video signal to IP video signal. Panasonic WJ-GXE500 Video Encoder delivers clear images with 3D Interlace-to-Progressive conversion and cable loss compensation. The compact WJ-GXE100 Video Encoder can be installed in various locations such as in the outdoor camera housing, in the outdoor power box, on the wall and ceiling, and in the room.

- Clear images
- Easy-to-install
- Space-saving design (19-inch rack mountable)

<table>
<thead>
<tr>
<th>WJ-GXE500 4-channel Video Encoder</th>
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<tr>
<td>Compact</td>
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<tr>
<td>WJ-GXE100 1-channel Video Encoder</td>
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5.2 Coaxial-LAN converter

If you want to keep using the existing coaxial cabling for any reason, Panasonic BY-HPE11KT Coaxial-LAN converter offers IP connection over the coaxial cable. Electric power can also be supplied to the IP camera through the coaxial cable.

- Effective usage of existing coaxial infrastructure
- Long distance connection (up to 2km (6,500ft))

| BY-HPE11KT Coaxial - LAN Converter (Left: Camera-side unit, Right: Center unit) |

5.3 Video Decoder

The Video Decoder enables PC-less IP camera monitoring, decoding IP video signal to HDMI or analog TV signal. It is suitable for the place such as remote sites.

- Non-PC IP camera monitoring

| WJ-GXD400 Video Decoder |
6. IP System solution

6.1 IP Matrix Server
The System970 i-PRO Management System is a feature-rich, high-reliable, scalable and flexible IP-based video surveillance management system that manages up to 2,048 IP and analog cameras, up to 64 IP and digital recorders, application servers and more. Designed based on distributed system architecture, the System970 is ideal for medium to large installations and multi-site systems. The System970 offers a smooth and cost-effective migration from an existing analog video surveillance system to an IP system.

6.2 VMS flexibility
A large number of industry-leading video management system companies join the Panasonic System Developer Network (PSDN) partner program. These seasoned partners provide excellent video management systems which have unique features.

7. Conclusion
IP video surveillance system provides huge benefits to surveillance such as exceptional image quality. As the result of these benefits, migration to IP system is no longer a question of “if” but “when.” Having a global support infrastructure, Panasonic assists you with the products and services you need to transition into the technology of the future wherever your analog system is today. Panasonic understands and can help you get the perfect video surveillance solution for your business.

For more information about Panasonic video surveillance cameras and solutions, please visit us at http://security.panasonic.com.
About Panasonic System Networks Co., Ltd

Panasonic System Networks Co., Ltd. is a subsidiary of Panasonic Corporation. The company was newly launched in 2013 by merging three companies: Panasonic System Networks Co., Ltd. and Panasonic System Solutions Infrastructure Co., Ltd., which were engaged in product development and manufacturing, and Panasonic System Solutions Japan Co., Ltd., which marketed a variety of system solutions.

The new company offers everything from development and manufacturing to sales, implementation and maintenance. By leveraging the full capabilities of this comprehensive enterprise to resolve customer problems and provide countermeasures, the new company is able to reinforce customer competitiveness while developing and expanding customer potential.

Our system proposals are based on our vast accumulation of image processing and communication technologies, backed by manufacturing knowhow, a versatile product range and IP expertise.