

# IP Video Surveillance

Allied Telesis Enhanced IP Camera Video Surveillance Solutions

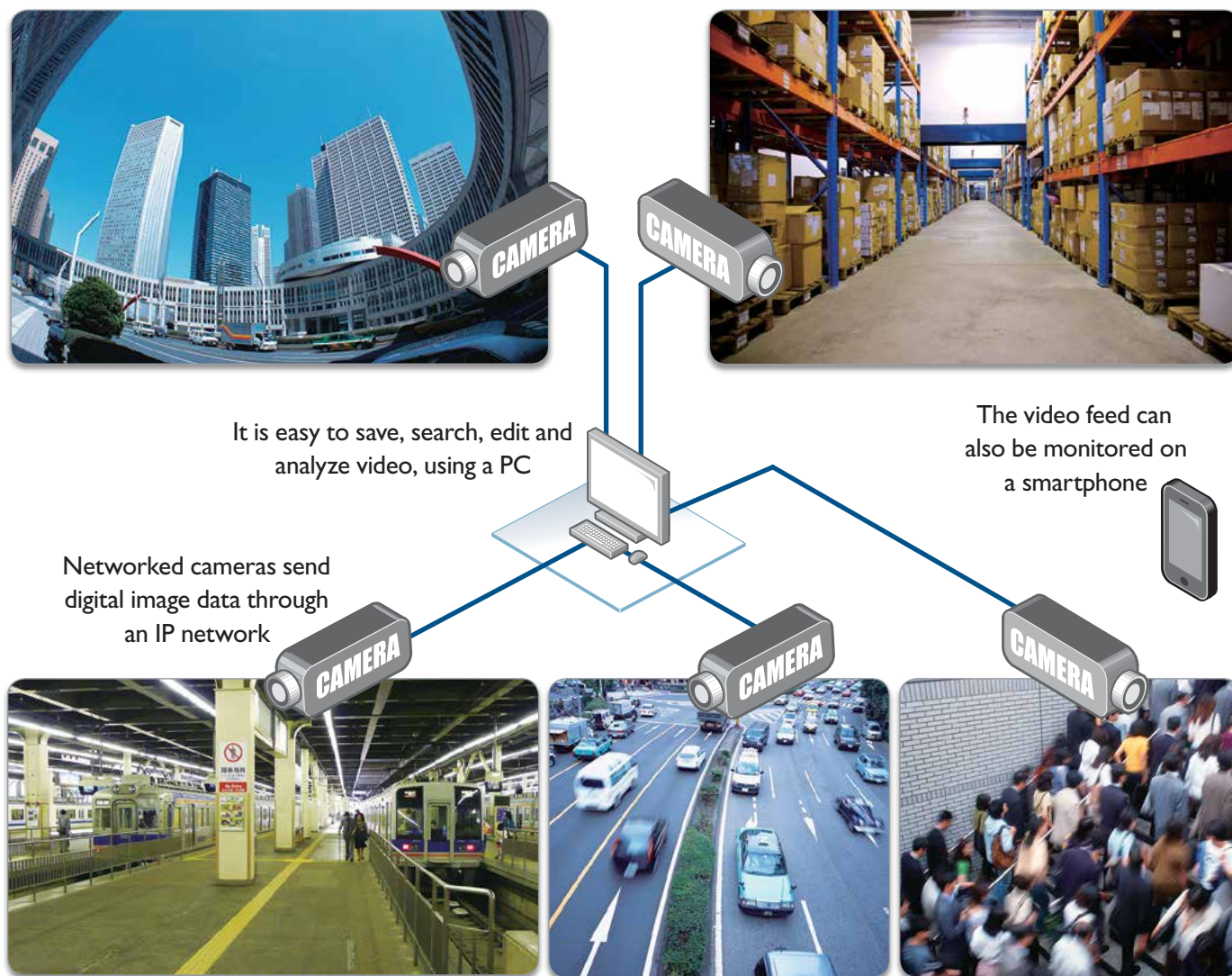


the **solution** : the **network**

# IP Video Surveillance

## The Benefits of Using Networked IP Cameras

With the evolution of CCTV technology, the emphasis has moved from simple monitoring of video footage to intelligent systems that are capable of identifying abnormal events or behavior.

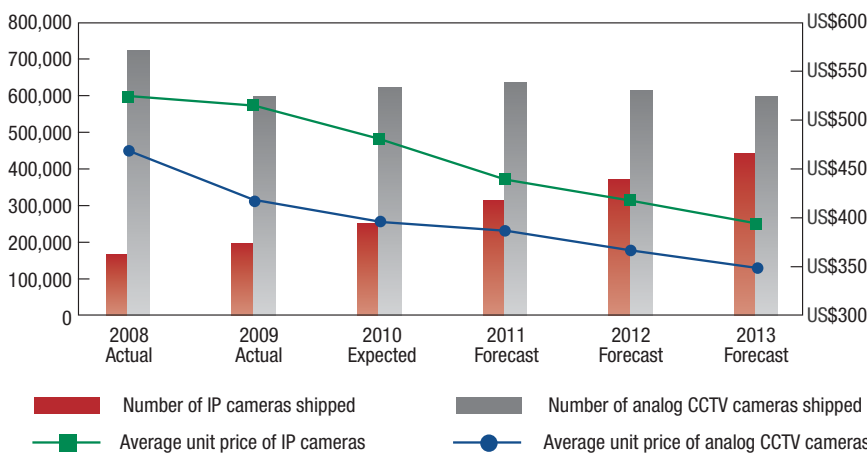


As intelligence increases in these systems, so too do the applications for this technology. Surveillance technology can now be used to observe consumer behavior in a retail environment and help organizations to increase revenue and profitability, while at the same time monitoring a store to reduce shrinkage.

This document explains some of the benefits of “intelligence” in IP surveillance systems and the advantages of working with Allied Telesis IP video surveillance solutions.

## IP Camera Usage Has Grown Rapidly

There has been a rapid transition from using analog cameras to using IP cameras. This has been driven by IP cameras' advanced features and ease of use. As the production of IP cameras has increased, the prices have decreased. The trend towards using IP cameras will certainly continue both in expansions of existing surveillance systems and in the installation of new surveillance systems.



Source: Complete Survey of the Remote Surveillance Market, 2010 by Fujitsu Economics Co. Ltd

## Advantages of Digital Camera Systems

- High definition images that do not degrade, and can be analyzed by software.
- Greater efficiency, as standard monitoring tasks can be automated by video analytics software.
- Reduced construction costs, due to simpler installation and cabling.
- Enhanced image distribution and system scalability.

## TECHNOLOGY BRIEF

# Digital Video Growth

Factors leading to the growth in digital video surveillance

### The end of analog-based broadcasting

» Most of the world is moving from analog to digital broadcasting. Digital video provides higher resolution images.

### Convergence into IP networking

» IP is becoming a universal communication medium. It is used for telephony, video conferencing and TV distribution.

### Crime prevention

» The deployment of video surveillance for crime prevention, and to aid in criminal investigations, is growing.

### Increasing expectations of disaster prevention systems

» Enterprises and local governments are devoting more energy and investment into minimizing the damage and disruption caused by natural disasters—earthquakes, tsunamis, etc.

### Technical improvements in surveillance cameras

» As the reliability, image resolution and video analysis capabilities of surveillance systems improve, the demand for these high-end features is growing.

	COMPARISON FACTORS	IP CAMERAS	ANALOG CAMERAS*
CAMERAS	Functionality	High, and growing	Low, not improving
	Price	Decreasing rapidly	Slowly decreasing
IMAGE QUALITY	Resolution	High, and improving	Low, not improving
	Degradation	Negligible	Significant
VIDEO STORAGE	Storage medium	NVR/PC/HDD	VCR (video tape)
	Save/check/control remotely	Yes	No

\*Without analog-to-digital conversion

**TECHNOLOGY BRIEF**

# Multicast and PoE

**Multicast communication: Transmitting video to multiple devices simultaneously**

Video surveillance systems frequently require video feeds to be sent to multiple destinations—to different monitoring stations and to storage—all at the same time. Delivering multiple copies of the video feed adds more load to the camera, and to the IP network; which can cause disruption of the data communication.

Multicast IP is a mode of data transmission that is optimized for delivery of a data stream to multiple destinations, simultaneously. The switches and routers duplicate the data stream only at the points where it needs to branch. Thereby, the data stream is delivered to multiple destinations, while maintaining optimal usage of network bandwidth.

**PoE and PoE+ simplify the installation of IP cameras**

PoE is the supplying of power through a LAN (UTP) cable. It is standardized as IEEE 802.3af. If a PoE-capable camera is supplied power by connecting it to a PoE-capable switch, then this one connection is all the cabling the camera requires. No separate power supply needs to be provided to the camera. This enables cameras to be installed in locations where providing power may previously have been difficult.

**PoE+ supplying more power**

The difference between PoE and PoE+ is the amount of power supplied. PoE+ supplies up to 30W per connection (twice as much as PoE). It is standardized as IEEE 802.3at. Even a camera with power consuming features like a heating demister and a lens wiper can be run off the power supplied by PoE+.

**1:1 Unicast communication**

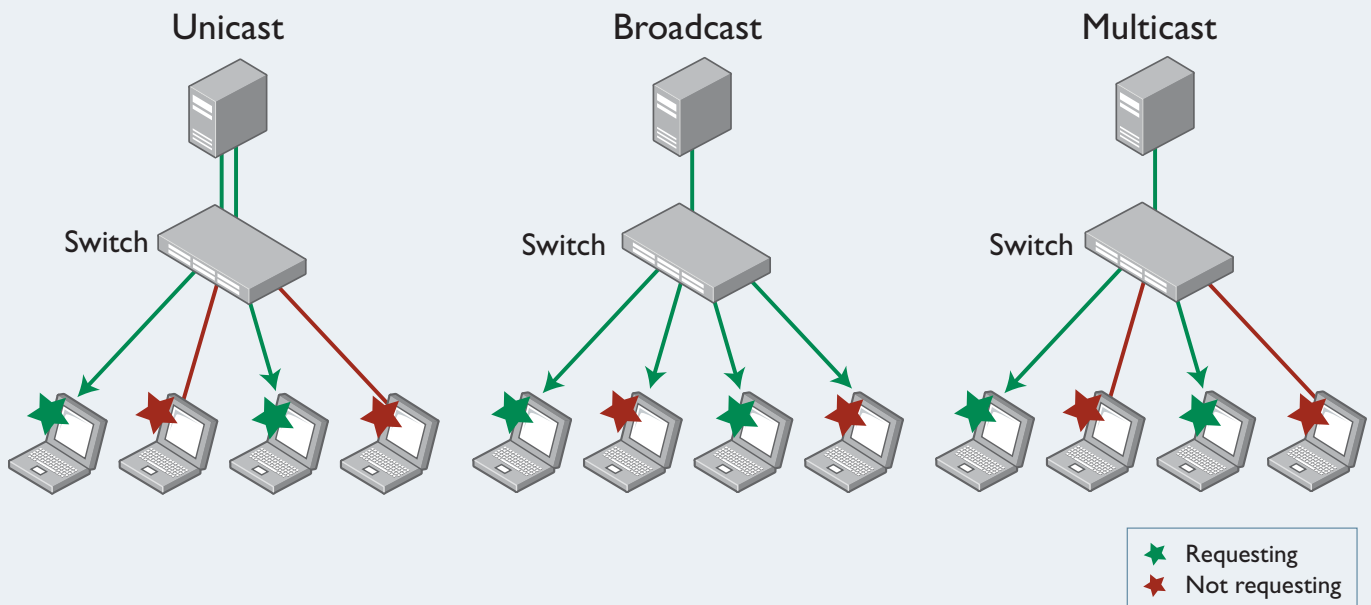
Replicate the data stream at source and transmit multiple copies to multiple destination addresses.

**1-to-n Broadcast communication**

Source sends a single copy of the data stream to a special address that tells the switch to send a copy of the stream to ALL connected destinations.

**1-to-n Multicast communication**

Source sends a single copy of the data stream to a special address that tells the switch to send copies ONLY to the devices that are requesting this stream.



	PoE	POE+
Standard	IEEE 802.3af	IEEE 802.3at
Maximum power per connection	15.4W	30.0W
DC voltage	44 ~ 57V	50V
Current	10 ~ 350mA	10 ~ 600mA
Choice of powered copper pair	Alternative A	

# Network Designs



## Create a High Reliability Network

Allied Telesis specializes in developing network equipment and has extensive experience in networking technology. IP cameras, as their name implies, rely on an IP network. To ensure good performance of the surveillance system, a highly reliable IP network must be provided. What constitutes a high reliability network?

### DESIGN STRATEGY 1

#### Create a Network Without Single Points of Failure

To achieve continuous video surveillance, data communication failure must be prevented when individual components fail. This requires a network design that uses resilience to avoid single points of failure.

- **Path Redundancy**—minimizes the disruption when a link fails. A ring network provides two possible communication paths, automatically detects failure in the primary path, and rapidly cuts over to the secondary path.
- **Path Resiliency**—provides dual active paths in the network. When one path fails, communication continues via the remaining active path. This is achieved in a star network by using aggregated links to a dual-switch core.
- **Power Supply Redundancy**—to cope with power blackouts, install UPSs (Uninterruptible Power Supplies) and employ dual power supplies in all network equipment.

### DESIGN STRATEGY 2

#### Integrate Video Surveillance with Existing LAN

Integrating the video surveillance network with the existing LAN reduces installation costs. The ongoing maintenance and management of the video surveillance network can be included into the overall IT system.

#### Maintain Quality of the Video Images and Performance of Existing Network

If insufficient network bandwidth is available, video will have dropouts, or distortion and pixilation. Overloading the network bandwidth will also reduce the performance of the existing network. To avoid these problems:

- Increase bandwidth in the network to 10Mbps /100Mbps /1Gbps.
- Control bandwidth allocation through prioritization and Quality of Service (QoS).
- Use VLANs to control bandwidth allocation, and provide efficient paths through the network.

### DESIGN STRATEGY 3

#### Use Technology that Simplifies Installation

A significant time and cost factor in the creation of a video surveillance network is the installation of LAN cables and power supplies. However, if PoE is used, then cabling of power supplies for cameras is not required, which saves time and money. This also creates a more flexible network that can be easily altered or extended in the future.

- Power supply provided by PoE/PoE+ switches.

#### Use Fiber Cables for Long Distance Connections

When IP cameras are installed over a large area, like a factory or campus, fiber cables are used for the long-run connections. The uplink connection on PoE switches can be provided by either copper or fiber cables.

#### Make Use of Existing Analog Cables

If coax cables have previously been installed to connect analog cameras, these cables do not have to be replaced. Media converters can be deployed to utilize the existing coax cable in the new IP network.

## DESIGN STRATEGY 4

### Support Multiple Types of Camera in the Same Network

Invariably, different brands of cameras will be installed into a network over time. As functionality requirements and budget constraints change, subsequent alterations or extensions of the system will likely introduce new models of cameras.

Typically, the network infrastructure is agnostic to the type of camera installed — as standards like IP and PoE drive interoperability between vendors. However, the monitoring, recording and camera control software may be vendor specific. When selecting this software, finding applications that are compatible with multiple vendors' cameras is preferable.

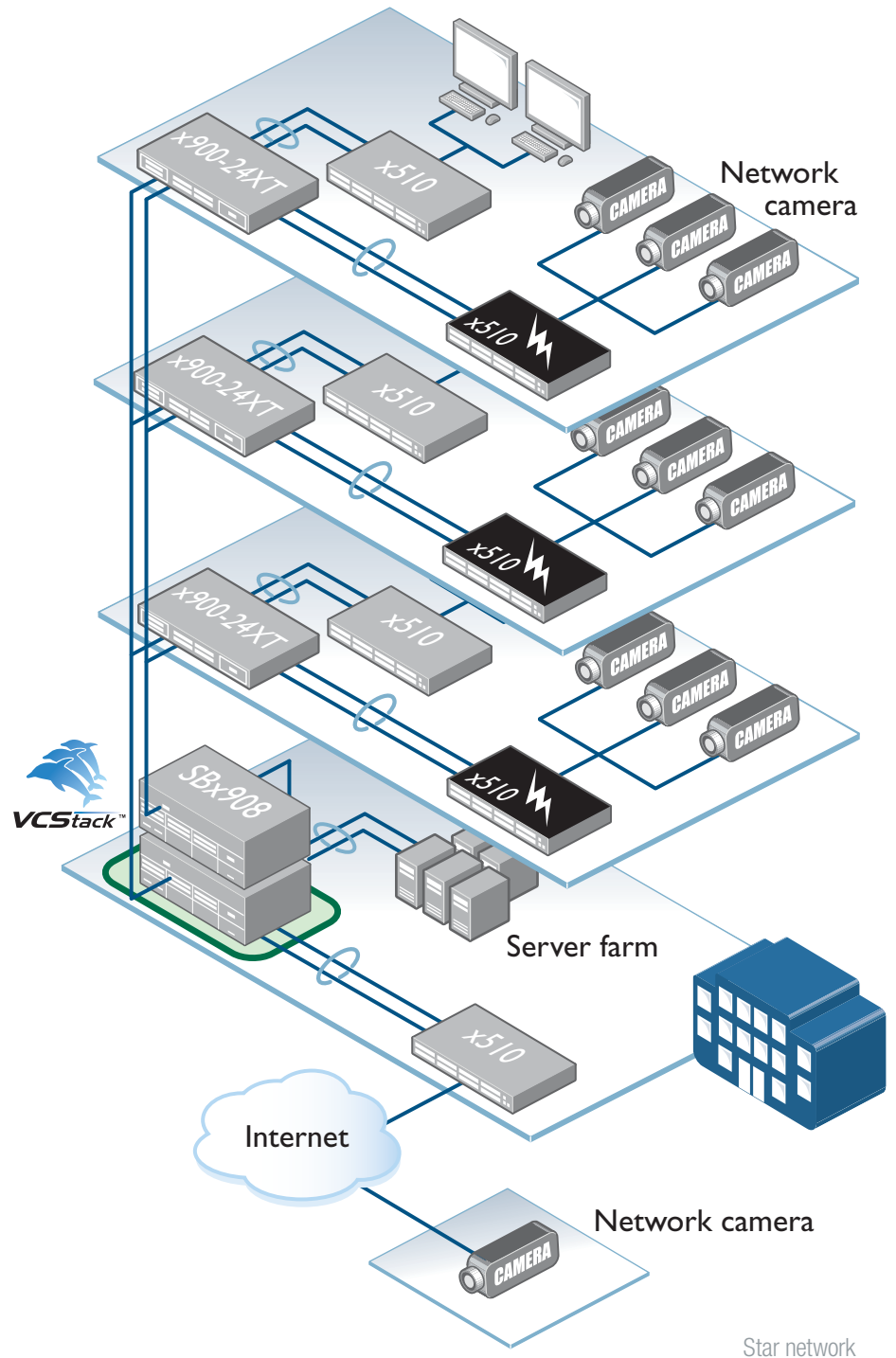
## DESIGN STRATEGY 5

### Pre-Installation Planning

Before installing the surveillance system, it is a good idea to develop an overall plan for the current and possible future scope of the network. A clear vision of how the network might change or expand in the future will help to avoid costly rework later on.

### Allied Telesis Provides Total Care

Allied Telesis provides comprehensive network design advice and support. It understands individual customer's needs, and works through the options that will best fulfill those needs. Allied Telesis network designs take into account the physical layout of the site, the integration with existing infrastructure and network management needs.



TECHNOLOGY BRIEF

# Ring Topology and QoS

**A ring network provides effective path redundancy and efficient cabling of long-run connections**

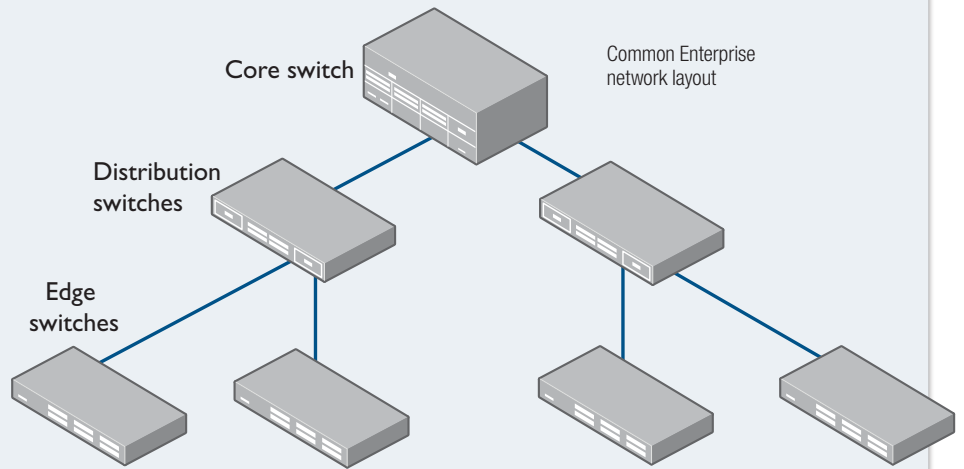
A ring network is the most efficient means of providing path redundancy over a large area. For example, in a ten-story building, the length of cabling needed for a star network is about 5.5 times what is needed for a ring network. The number of cables required for a star network is about 1.8 times that for a ring network. In larger-scale installations, like multi-building factories or small towns, the cost-effectiveness of a ring network is even more significant. There are savings in cabling, time and switching equipment.

**QoS prevents image corruption**

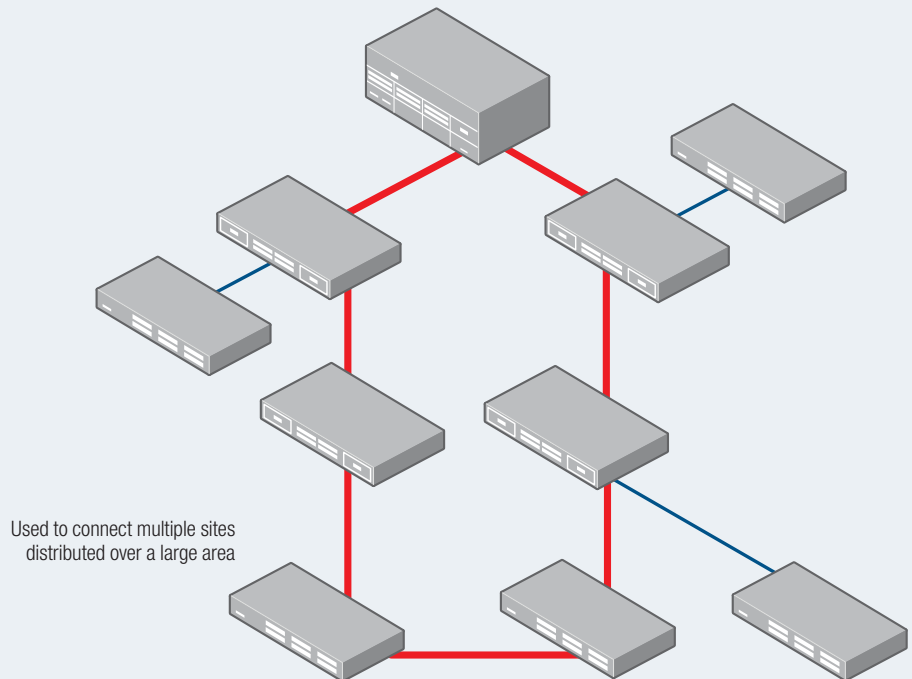
QoS is the technology that provides appropriate levels of network service to different applications that share the same network. In policy-based QoS, network devices classify data into different groups, and apply different transmission priorities to the different classes of data.

If top priority is given to video and voice data, then those services are protected from disruption.

## Hierarchical Star Network



## Ring Network



# High Profile IP Surveillance Networks

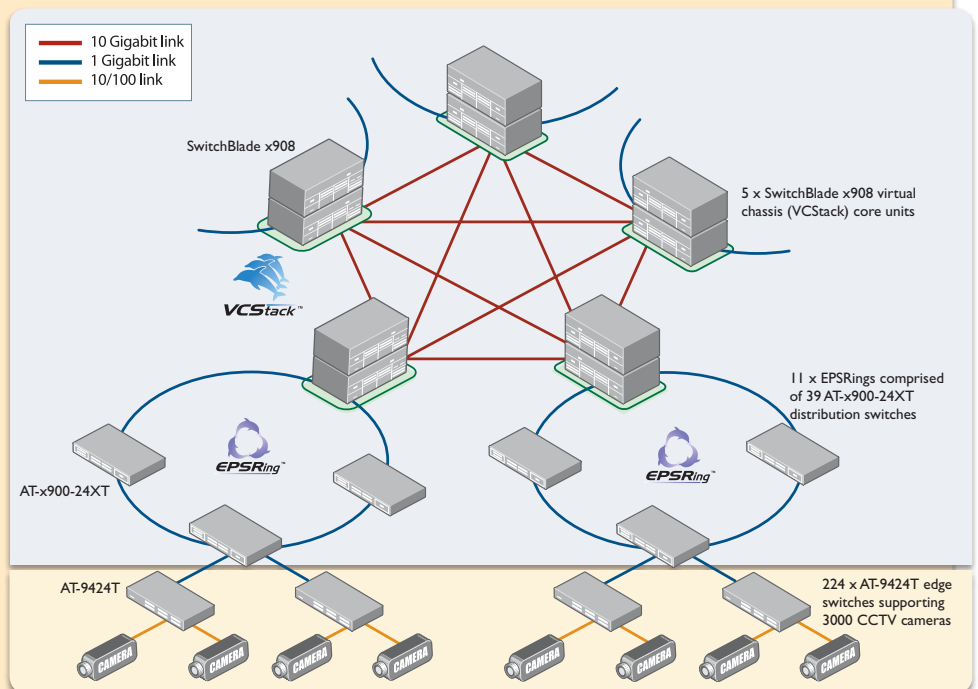
## Allied Telesis Solutions Have Been Customized to Suit the Specific Needs of Each Installation

Allied Telesis is an equipment vendor and networking specialist that provides highly reliable networks; and Allied Telesis IP surveillance solutions have been deployed globally. Allied Telesis creates solutions that satisfy customer requirements, and focuses on expanding these solutions to more locations and a broader range of applications.

## Traffic Monitoring System Based on IP Cameras

### BANGKOK METROPOLITAN ADMINISTRATION

Bangkok, the capital of Thailand, with a population of nine million, is a truly international city within this fast-developing Asian region. The Bangkok Metropolitan Administration (BMA) has overall jurisdiction for administration and public infrastructure in the municipal area, which is comprised of 50 separate local authorities. BMA selected the Allied Telesis solution for their traffic management system. The traffic management system is an important part of their on-going development of the city's infrastructure, and works hand-in-hand with the improvements in public transportation and upgrading safety management systems.



\* Products shown in the diagram are only representative and may differ from those actually used.



### Requirement

To install a reliable IP traffic surveillance system that covers the entire Bangkok metropolitan area.

### Network Requirements

- High bandwidth
- Consistent high performance
- Resilient to link and unit failure

### Key Criteria in Selecting Allied Telesis

- Highly reliable Gigabit switches
- Excellent multicast IP
- Resilient ring-based network design

### Benefits Provided by the System

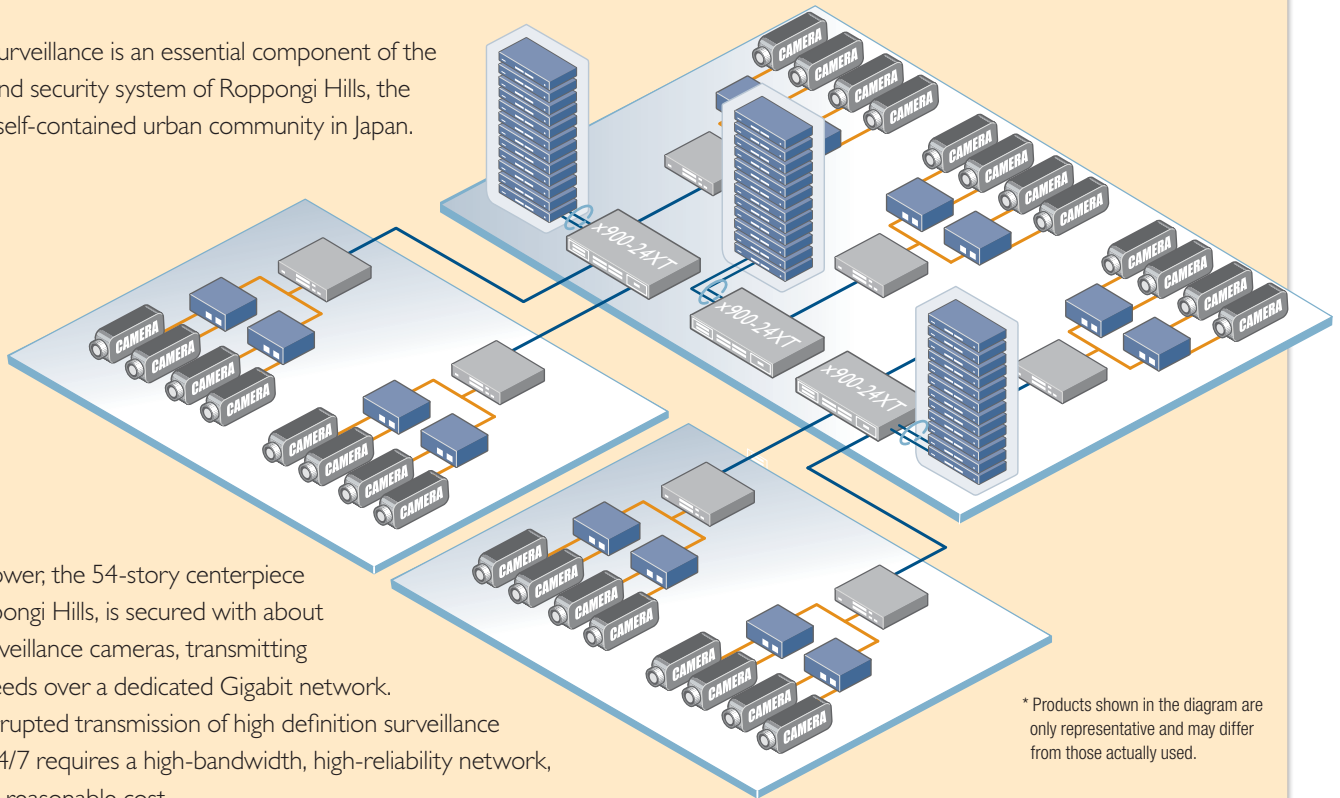
With this surveillance system installed, and running continuously 24/7, the city is able to deal more effectively with the daily traffic congestion. The city's five-year development plan includes a "Healthy City Development" guideline, developed by the WHO (World Health Organization). Part of the guideline is the implementation of a system to "Receive real-time images and information from all areas of Bangkok." The advanced IP surveillance system helps Bangkok achieve this goal.



## Building a Surveillance System in Roppongi Hills

**MORI BUILDING CO. LTD.**

Video surveillance is an essential component of the safety and security system of Roppongi Hills, the largest self-contained urban community in Japan.



Mori Tower, the 54-story centerpiece of Roppongi Hills, is secured with about 600 surveillance cameras, transmitting video feeds over a dedicated Gigabit network. Uninterrupted transmission of high definition surveillance video 24/7 requires a high-bandwidth, high-reliability network, but at a reasonable cost.

### Requirement

To provide a highly reliable building surveillance network, which supports around 600 cameras and carries high volumes of video data.

### Challenges

- Reliable operation 24/7
- High bandwidth
- Affordable cost
- Robust performance

### Key Reason for Selecting Allied Telesis

The network would be constructed with Allied Telesis x900 Series switches, which provide high performance, reliability, and are easily managed—all at an affordable price.

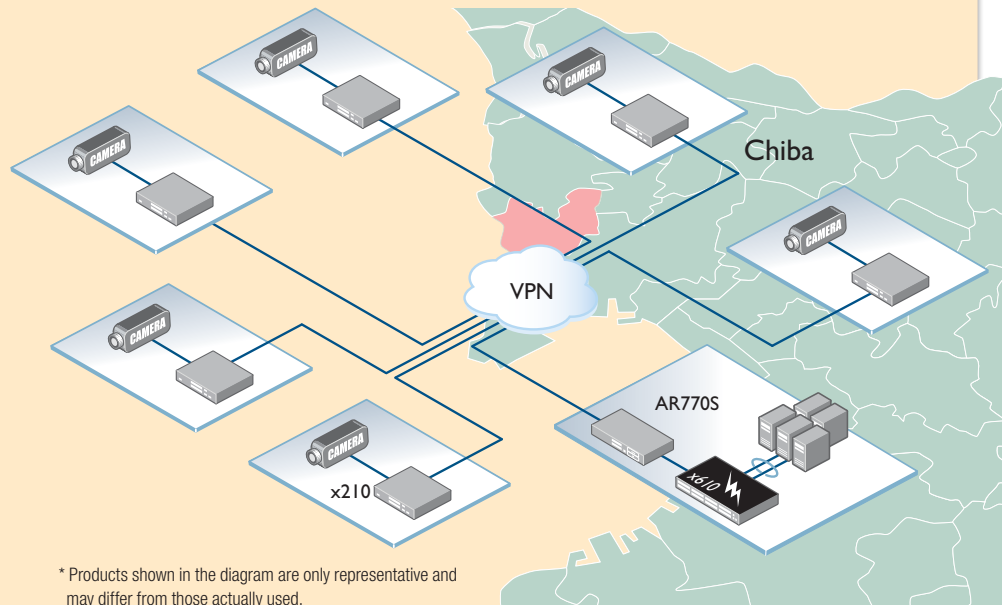


## Security Camera Network in the Streets

### ICHIKAWA CITY MUNICIPALITY IN CHIBA PREFECTURE

The Ichikawa City Municipality in Japan set a high priority on creating a safe and secure urban environment. It also has a drive to enhance administration services by utilizing Information and Communication Technologies (ICT). The municipal administration installed 500 security cameras throughout the city to help prevent crime, and reverse the citizen's perception of deteriorating safety.

An Allied Telesis VPN solution is being used to connect remote cameras to the central video servers.



#### Requirement

Create a highly reliable VPN network to support approximately 150 cameras in various locations around the city.

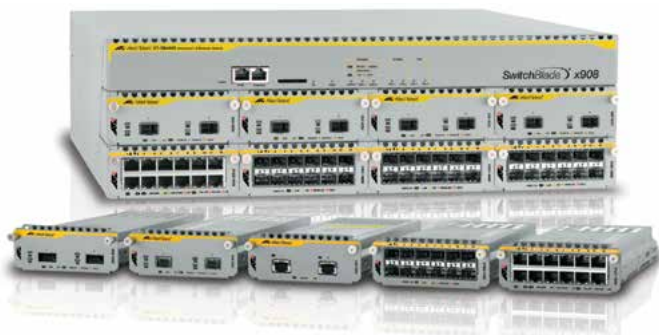
#### Reliability

- Uninterrupted video feeds
- Secure data

#### Key Reasons for Selecting Allied Telesis

- Highly reliable and feature-rich VPN equipment

# Featured Products



## SwitchBlade® x908

### ADVANCED LAYER 3+ MODULAR SWITCH

The Allied Telesis SwitchBlade x908 advanced Layer 3 modular switch offers high flexibility and density in a small physical size. It provides scalable and versatile switching solutions for today's data center networks. Each chassis supports up to eight high-speed 60Gbps expansion bays, and is also capable of being stacked.



## x610 Series

### ADVANCED LAYER 3 GIGABIT ETHERNET STACKABLE SWITCHES

The Allied Telesis x610 Series is a high performing and scalable solution for today's networks, providing an extensive range of port-density and uplink-connectivity options. 24- and 48-port versions are available with optional 10 Gigabit uplinks and PoE+ ports. The ability to stack up to eight units includes using fiber for long-distance stacking. The x610 Series can connect anything from a small workgroup right up to a large business.



## x900 12 and 24

### ADVANCED LAYER 3 SWITCHES

Allied Telesis x900 Series Layer 3+ switches have high-speed 60Gbps expansion bays, which provide a high level of port flexibility and application versatility unmatched by any other IRU Gigabit Ethernet switch on the market. The expansion modules can be used in a variety of configurations to provide tailored solutions that meet wide-ranging physical networking requirements.



## x510 Series

### STACKABLE GIGABIT SWITCHES

The Allied Telesis x510 Series of stackable Gigabit switches includes a full range of security and resiliency features, coupled with easy management, making them the ideal choice for network access applications. The x510 Series is available in 24- and 48-port versions with optional 10 Gigabit uplinks and PoE+ ports. Up to four units may be stacked with VCStack, using fiber for long-distance stacking.

## SECURITY SWITCH FEATURES

	FEATURE	8000S	8000GS	8100S	8600	x510	x600
<b>FORM FACTOR</b>		» Rack Mount » Stackable	» Rack Mount » Stackable	» Rack Mount » Stackable <sup>1</sup>	» Rack Mount	» Rack Mount » Stackable	» Rack Mount » Stackable
<b>SWITCH FUNCTIONALITY</b>		Layer 2	Layer 2	Layer 2+/Layer 3	Layer 3	Layer 2+/Layer 3	Advanced Layer 3+
<b>PORTS AND MEDIA SUPPORT</b>	10/100TX	24 or 48		24 or 48	24 or 48		
	10/100/1000T	2 (Combo)	24	2 (Combo)	2 (Combo)	24 or 48	24 or 44
	SFP	2 (Combo) 100M or 1000M	4 (Combo) 100M or 1000M	2 (Combo) 100M or 1000M	2 (Combo) 1000M	2 or 4 <sup>2</sup> 1GbE/10GbE	4 (Combo) 1000M
	Fixed XFP (10GbE)						2 (XP Series)
	Fixed SFP+ (10GbE)					2 or 4 <sup>2</sup>	
	Modular uplinks				2		
<b>MODULAR UPLINKS</b>	100FX (MM)				2		
	10/100/1000T / SFP Combo				2		
	10/100/1000T ports						
	SFP (100M / 1000M)						
	XFP						
	SFP+						
<b>POWER SUPPLY</b>	PSU type	Fixed Internal	Fixed Internal	Fixed Redundant Internal	Fixed Internal	Dual Fixed Redundant Internal	Fixed Internal
	-48VDC PSU option						
	Fixed Redundant PSU			■		■	
	Redundant PSU option				■		■
	Redundant PSU chassis (inc. 1 PSU)				RPS3004 RPS3104 (PoE)		RPS3204
	Additional redundant PSU				PWR3004 PWR3101 (PoE)		PWR3202
<b>POWER OVER ETHERNET</b>	IEEE 802.3af option	■	■	■	■	■	■
	PoE-enabled ports	24 or 48	24	24 or 48	24	24 or 28	24
	Max. no. of full power (15W) ports	12 or 24	18	24	24	24	24
	Max no. of POE+ (30W) ports			12		12	
	PoE power	180W or 375W	140W	370W	400W	370W	370W
<b>SCALABILITY</b>	MAC address table size	8K	8K	16K	8K	16K	16K
	Stacking	■ (6)	■ (6)	■ (8) <sup>4</sup>		■ (4) Requires StackXS or StackOP modules	■ (4) Requires StackXG module
	L2 Multicast table size	256	256	255	255	1024	1024
	L3 Multicast table size				Up to 1K	256	512
<b>ENVIRONMENTAL</b>	Cooling	Fan	Fan	Fan	Fan	Fan	Fan
	Temperature range	0°C to 40°C	0°C to 40°C	0°C to 40°C	0°C to 40°C	0°C to 45°C	0°C to 40°C
<b>MANAGEMENT</b>	IOS	AlliedWare Plus	AlliedWare Plus	AlliedWare Plus	AlliedWare	AlliedWare Plus	AlliedWare Plus
	Web	■	■	■	■	■	■
	CLI / Telnet / SNMP / SSH	■	■	■	■	■	■
<b>NETWORK RESILIENCE</b>	Spanning-Tree	■	■	■	■	■	■
	Link Aggregation	■	■	■	■	■	■
	EPSRing					■	■
<b>QoS</b>	IEEE 802.1p queues	4	4	8	4	8	8
	IEEE 802.1p CoS	■	■	■	■	■	■
	IP DiffServ / DSCP	■	■	■	■	■	■
	Advanced Classifiers			■	■	■	■
<b>SECURITY</b>	IEEE 802.1Q VLAN's	256	4K	4K	256	4K	4K
	RADIUS / IEEE 802.1x	■	■	■	■	■	■
	TACACS+	■	■	■	■	■	■
	SSH/SSL	■	■	■	■	■	■
	DoS protection				■	■	■
<b>ROUTING</b>	RIPv1 and RIPv2 / IPv4			■	■	■	■
	IPv6 <sup>5</sup>			■		■	■
	OSPFv2 / VRRP <sup>6</sup>				■	■	■
	PIM <sup>7</sup>				■	■	■

<sup>1</sup> Stacking supported on 24 port models only

<sup>2</sup> Stacking not supported when using stack ports for 10GbE support

<sup>3</sup> Ts models require AT-x6EM/XS2 for 10GbE support, Ts/X require AT-x6EM/XS2 to support 4 SFP+ interfaces

<sup>4</sup> XEM-STK requires AlliedWare Plus

<sup>5</sup> IPv6 support may require feature license – contact your local Allied Telesis representative

<sup>6</sup> OSPF and/or PIM support may require feature license – contact your local Allied Telesis representative

<sup>7</sup> PIM support may require feature license – contact your local Allied Telesis representative

## SECURITY SWITCH FEATURES

	FEATURE	x610	9900	x900	SBx8112	SBx908
<b>FORM FACTOR</b>		» Rack Mount » Stackable	» Rack Mount	» Rack Mount » Stackable	» Rack Mount » Chassis-based	» Rack Mount » Chassis-based » Stackable
<b>SWITCH FUNCTIONALITY</b>		Advanced Layer 3+	Advanced Layer 3+	Advanced Layer 3+	Advanced Layer 3+	Advanced Layer 3+
<b>PORTS AND MEDIA SUPPORT</b>	10/100TX					
	10/100/1000T	24 or 48 (exc SP)	24 (9924T)	24 (x900-24XT)		
	SFP	2 or 4 (Combo) 100M or 1000M (Copper models) 24 100M or 1000M (24SP)	4 (Combo 9924T) 1000M 24 (9924SP) 100M or 1000M	24 (x900-24XS) 100M or 1000M		
	Fixed XFP (10GbE)					
	Fixed SFP+ (10GbE)	2 or 4 <sup>2,3</sup>				
	Modular uplinks			2	10	8
<b>MODULAR UPLINKS</b>	100FX (MM)					
	10/100/1000T / SFP Combo					
	10/100/1000T ports			24	240	96
	SFP (100M / 1000M)			24	240	96
	XFP			4		16
	SFP+	2		4	60	16
<b>POWER SUPPLY</b>	PSU type	Fixed Internal (non-PoE) Removable Internal (PoE)	Hot Swap Internal	Hot Swap Internal	Hot Swap Internal	Hot Swap Internal
	-48VDC PSU option	■	■	■	■	■
	Fixed Redundant PSU					
	Redundant PSU option	■	■	■	■	■
	Redundant PSU chassis (inc. 1 PSU)	RPS3000				
	Additional redundant PSU	PWR250 PWR800 (PoE) PWR1200 (PoE)	PWR01	PWR01	SBxPWRSYS1 SBxPWRPOE1	PWR05
<b>POWER OVER ETHERNET</b>	IEEE 802.3af option	■			■	
	PoE-enabled ports	24 or 48			240	
	Max. no. of full power (15W) ports	24 or 48			155	
	Max no. of POE+ (30W) ports	26			80	
	PoE power	780W			2400W	
<b>SCALABILITY</b>	MAC address table size	32K	16K	16K	32K	16K/64K
	Stacking	■ (8) Requires StackXG module		■ (2) Requires XEM-STK module <sup>4</sup>		■ (2) Requires HS-STK cable
	L2 Multicast table size	2048	Up to 4K	Up to 4K	Up to 4K	Up to 4K
	L3 Multicast table size	Up to 1K	Up to 1K	Up to 1K	Up to 1K	Up to 1K
<b>ENVIRONMENTAL</b>	Cooling	Fan	Hot swap fan module	Hot swap fan module	Hot swap fan module	Hot swap fan module
	Temperature range	0°C to 45°C	0°C to 50°C	0°C to 40°C	0°C to 40°C	0°C to 40°C
<b>MANAGEMENT</b>	IOS	AlliedWare Plus	AlliedWare	AlliedWare or AlliedWare Plus	AlliedWare Plus	AlliedWare Plus
	Web	■	■	■	■	■
	CLI / Telnet / SNMP / SSH	■	■	■	■	■
<b>NETWORK RESILIENCE</b>	Spanning-Tree	■	■	■	■	■
	Link Aggregation	■	■	■	■	■
	EPSRing	■	■	■	■	■
<b>QoS</b>	IEEE 802.1p queues	8	8	8	8	8
	IEEE 802.1p CoS	■	■	■	■	■
	IP DiffServ / DSCP	■	■	■	■	■
	Advanced Classifiers	■	■	■	■	■
<b>SECURITY</b>	IEEE 802.1Q VLAN's	4K	4K	4K	4K	4K
	RADIUS / IEEE 802.1x	■	■	■	■	■
	TACACS+	■	■	■	■	■
	SSH/SSL	■	■	■	■	■
	DoS protection	■				
<b>ROUTING</b>	RIPv1 and RIPv2 / IPv4	■	■	■	■	■
	IPv6 <sup>5</sup>	■	■	■	■	■
	OSPFv2 / VRRP <sup>6</sup>	■	■	■	■	■
	PIM <sup>7</sup>	■	■	■	■	■

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### **About Allied Telesis, Inc.**

Founded in Japan in 1987 and with offices worldwide, Allied Telesis is a leading provider of networking infrastructure and flexible, interoperable network solutions. The company provides reliable video, voice and data network solutions to clients in multiple markets including government, healthcare, defense, education, retail, hospitality and network service providers.

Allied Telesis is committed to innovating the way in which services and applications are delivered and managed, resulting in increased value and lower operating costs.

Visit us online at [alliedtelesis.com](http://alliedtelesis.com).



the **solution** : the **network**

**North America Headquarters** | 19800 North Creek Parkway | Suite 100 | Bothell | WA 98011 | USA | T: +1 800 424 4284 | F: +1 425 481 3895

**Asia-Pacific Headquarters** | 11 Tai Seng Link | Singapore | 534182 | T: +65 6383 3832 | F: +65 6383 3830

**EMEA & CSA Operations** | Incheonweg 7 | 1437 EK Rozenburg | The Netherlands | T: +31 20 7950020 | F: +31 20 7950021

[alliedtelesis.com](http://alliedtelesis.com)

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