



CCTV on IP Network

How Cisco IT Deploys Closed-Circuit TV Cameras over the Secure IP Network



A Cisco on Cisco Case Study: Inside Cisco IT

Overview

- Challenge

Security transitioned from “analog” closed-circuit TV (CCTV) for surveillance to “digital” CCTV for surveillance. After the transition, Security realized that a different skill set (IT server support) was needed in using servers with hard drives compared to using video cassette recorders (VCRs).

- Solution

Change from a “silo” support model where Security purchased and self-managed equipment to working closely with IT to deploy standard server equipment for CCTV.

- Results

An “IT-managed” solution for CCTV over IP.

Overview (Contd.)

- Next Steps

The Cisco® Security, Technology, and Systems (STS) department is monitoring the evolution of IP cameras to replace the existing analog cameras.

Background - Analog CCTV Surveillance

- The STS department manages internal security for more than 300 facilities worldwide
- The department deploys security technologies such as:
 - Physical intrusion detection and electronic security access control systems, including more than 6000 card readers and more than 2600 CCTV cameras for surveillance
- When Cisco® first began using CCTV for surveillance, analog cameras were placed at building entrances and other high-security locations, and sent analog video signals over coaxial cable to VCRs that recorded onto tape

Background - Security Issues with VHS

- Managing tapes was labor intensive and prone to human error



For every VCR in operation, Cisco® needed to store 31 tapes—one for each day of the month. A month's worth of video from the current 2600 cameras would fill nearly 10,000 tapes.

- Security guards had to physically visit each building daily to verify that the recorders were operating and to store the old tape, and insert a fresh one

Forgetting to press the record button meant a day of lost video—and the risk that Cisco would have no video evidence to investigate an incident.

- If a break-in or theft occurred, the facility had to send the physical tapes to the STS department at Cisco headquarters, resulting in investigative delays of up to several days

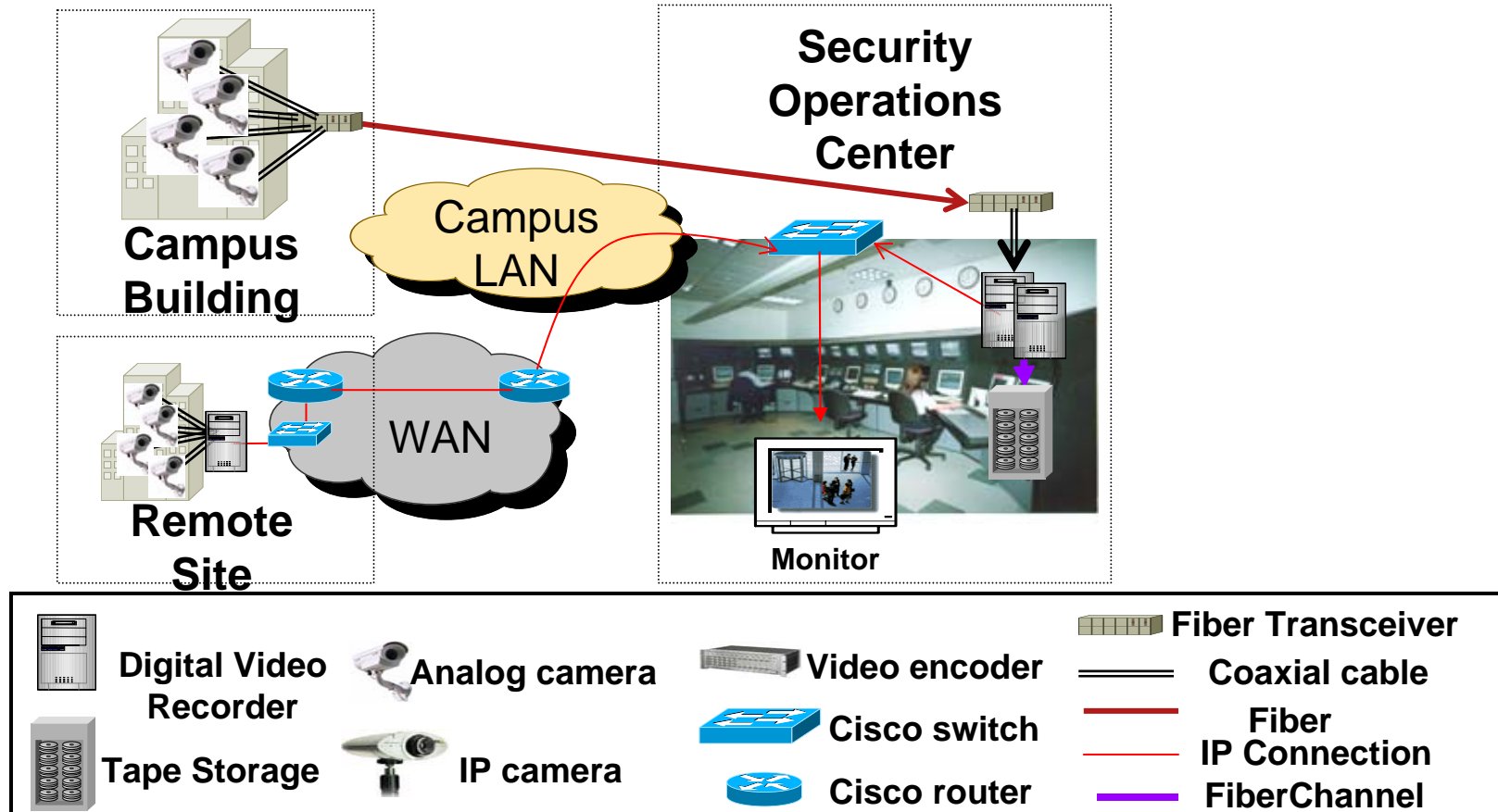
Background - VCRs to DVRs

- In 1999, the STS department transitioned from VCRs to a third-party digital video recorder (DVR) card running on a Microsoft Windows NT 4.0 server platform
 - A systemwide conversion from VCRs to DVRs would save human resources—no one would be replacing tapes
 - Video retrieval during investigations would be faster and more efficient
- The analog camera sends an analog signal over coaxial cable, but rather than capturing the video on a VHS tape, Cisco® captures it on a proprietary card in a server that converts the signal to digital and then stores the digitally-encoded video on a local hard disk



Digital Video Recorder

Background - Previous CCTV Solution



The DVR software could be programmed to store only the video that included motion, Cisco® could store data collected during an entire month on direct attached storage within the DVR server

Challenge - Higher Management Skills Needed

- After storing digital surveillance video on DVRs, the system grew until the STS department found itself managing more than 330 servers at Cisco® facilities worldwide

The department was overburdened with keeping these 330 servers online and up to date with the latest software patches

- The major problem resulting from our transition to digital surveillance video was that servers with hard drives require a higher management skill set compared with VCRs

Traditional security investigators do not understand server software patches, secure access, and data backups, and these are among the IT Infrastructure group's core competencies

Solution - IT-Managed Solution for CCTV

- The Security, Technology and Systems department collaborated with IT to establish an IT-managed solution for CCTV over IP. The criteria for the solution covered the following areas:

IT standards-compliance

High video quality

Enterprise-friendly topology

Network-friendly design

Integration with access control and intrusion detection section

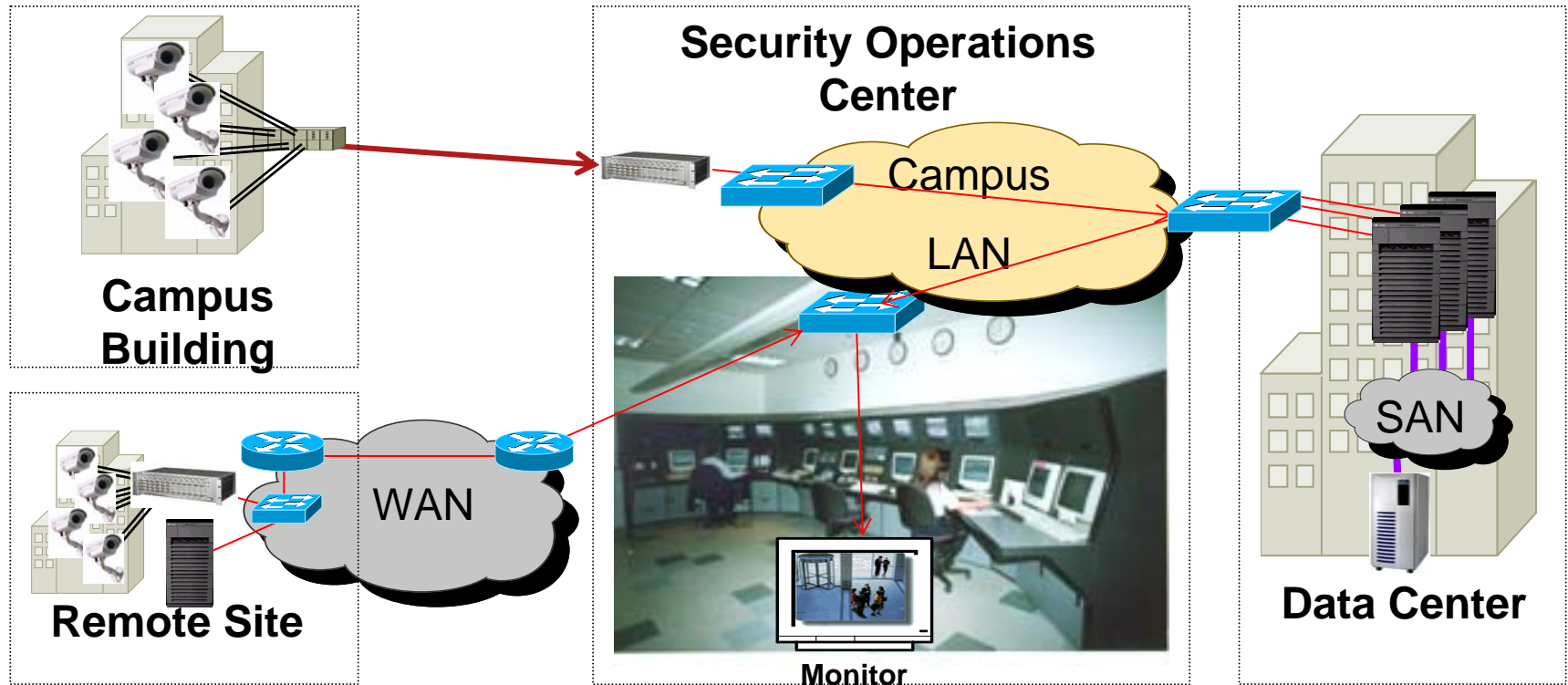
Upgradability



Solution - IT-Managed Solution for CCTV (Contd.)

- Cisco® decided to transition from its original proprietary DVR solution to a network-centric application

Solution - Present CCTV over IP Solution



	Network Video Recorder		Analog camera		Video encoder		Fiber Transceiver
	Storage		IP camera		Cisco switch		Coaxial cable
					Cisco router		Fiber
							IP Connection
							FiberChannel

Results - Benefits for Cisco

- Migrating to CCTV over IP has yielded the following benefits for Cisco®:

Lowered storage requirements by 60 percent, representing US\$500,000 in savings

Reduced the number of servers by 40 percent, representing \$200,000 in savings

Improved video quality – at four frames per second, the ability to recognize faces is vastly improved over the previous system's two frames per second

Gained ability to unify the CCTV system with other security systems, such as alarm detection and access control systems

Results - Benefits for Cisco (contd.)

- Reduced false alarms in areas covered by video surveillance cameras by an anticipated 90 percent
- Mitigated risk by expediting maintenance and repair
- Trimmed the time required to investigate security incidents
- Reduced maintenance costs by 20 percent because Cisco IT has economies of scale and spends less time monitoring and maintaining servers

Results - Benefits for Cisco (contd.)

- Increased security – network protection and virus definitions are implemented as soon as available instead of when we have time for it



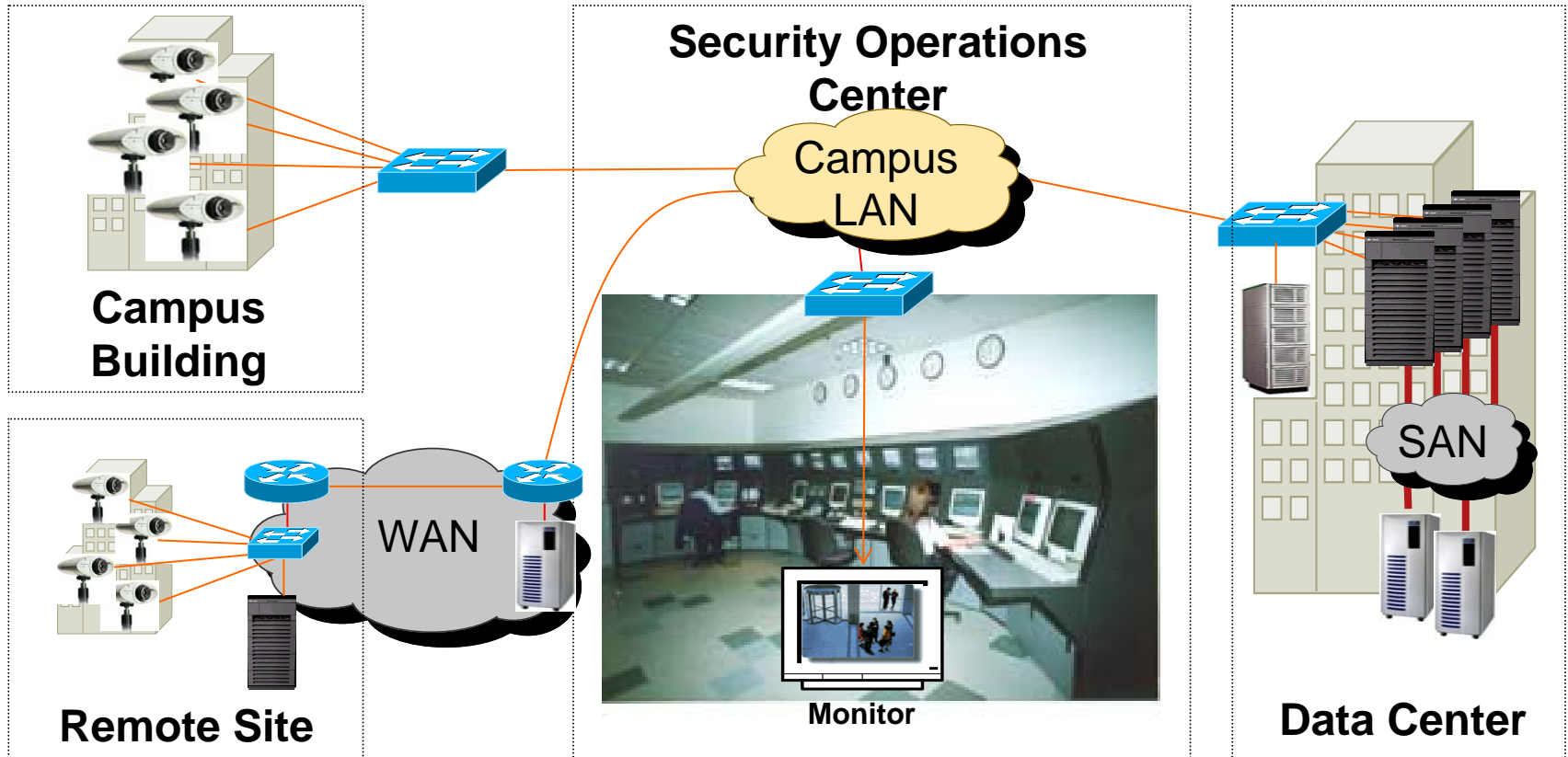
Next Steps - IP Cameras











- The STS group is monitoring the evolution of IP cameras to replace the existing analog cameras

Traffic will be sent directly from the IP camera to the data center, eliminating the need for standalone encoders and freeing fiber for Safety and Security to use for other purposes, if needed

- A major condition for migrating to digital cameras is the development of a format with lower bandwidth consumption

Next Steps - IP Cameras Replace Analog Cameras



	Network Video Recorder		Video analysis engine (server)		Video encoder		Fiber
	Storage		IP camera		Cisco switch		IP Connection
					Cisco router		FiberChannel

Next Steps - Technology Advancements

- STS is investigating more flexible and capable video encoders to allow use of a variety of existing and newer cameras
- Another possible solution is using storage equipment in WAN hub sites to support collection and storage of more remote site data without requiring it to be stored locally or transmitted across the WAN and burdening WAN links



Digital Video Storage

Next Steps - Surveillance Video Violations

- The STS group is actively pursuing video analysis engines that monitor the surveillance video for violations of Cisco® business rules

For instance, an individual walking the wrong way in a one-way area, standing in front of a lobby desk for more than a certain number of seconds, or leaving an unattended package

- Security could automatically track and respond to people “tailgating” into buildings; that is, people entering the building directly behind employees who have correctly used their badges to unlock the door

With this capability, surveillance video becomes a tool for prevention and early detection rather than simply reaction to incidents



Lessons Learned

- The chief lessons learned from the transition to digital CCTV pertain to making the best use of Cisco® IT resources

Physical security and IT security are converging – both groups need to work more closely than before

- As the use of technology for physical security increases, computer literacy will become increasingly important
- We had to shift our culture to let IT do the work and run through its own processes

All parties agree that the culture change required to partner with IT yielded dividends

To read the entire case study, or for additional Cisco IT case studies on a variety of business solutions, visit Cisco on Cisco: Inside Cisco IT

www.cisco.com/go/ciscoit



CISCO



Americas Headquarters

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 527-0883


Asia Pacific Headquarters

Cisco Systems, Inc.
168 Robinson Road
#28-01 Capital Tower
Singapore 068912
www.cisco.com
Tel: +65 6317 7777
Fax: +65 6317 7799

Europe Headquarters

Cisco Systems International BV
Haarlerbergpark
Haarlerbergweg 13-19
1101 CH Amsterdam
The Netherlands
www-europe.cisco.com
Tel: +31 0 800 020 0791
Fax: +31 0 20 357 1100

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

 ©2007 Cisco Systems, Inc. All rights reserved. CCVP, the Cisco logo, and the Cisco Square Bridge logo are trademarks of Cisco Systems, Inc.; Changing the Way We Work, Live, Play, and Learn is a service mark of Cisco Systems, Inc.; and Access Registrar, Aironet, BPX, Catalyst, CCDA, CCDP, CCIE, CCIP, CCNA, CCNP, CCSP, Cisco, the Cisco Certified Internetwork Expert logo, Cisco IOS, Cisco Press, Cisco Systems, Cisco Systems Capital, the Cisco Systems logo, Cisco Unity, Enterprise/Solver, EtherChannel, EtherFast, EtherSwitch, Fast Step, Follow Me Browsing, FormShare, GigaDrive, HomeLink, Internet Quotient, IOS, iPhone, IP/TV, iQ Expertise, the iQ logo, iQ Net Readiness Scorecard, iQuick Study, LightStream, Linksys, MeetingPlace, MGX, Networking Academy, Network Registrar, Packet, PIX, ProConnect, RateMUX, ScriptShare, SlideCast, SMARTnet, StackWise, The Fastest Way to Increase Your Internet Quotient, and TransPath are registered trademarks of Cisco Systems, Inc. and/or its affiliates in the United States and certain other countries.

All other trademarks mentioned in this document or Website are the property of their respective owners. The use of the word partner does not imply a partnership relationship between Cisco and any other company. (0704R)