Video: Improving Collaboration in the Enterprise Campus

Introduction: Video Goes Mainstream

In today's global marketplace, businesses are becoming increasingly dispersed and mobile. More than ever, companies are looking to networking technology to bring their employees, customers, and business partners together—regardless of their location. Enterprise companies are increasingly turning to rich-media applications such as video to increase worker productivity by improving collaboration, communication, and training, while reducing overall costs.

To take full advantage of these video innovations, companies need to be sure that their campus network is ready to meet the demands video applications place on the infrastructure, and ensure a solid user experience.

Cisco has long been an industry leader in network technology, and is now developing and bringing to market many innovative video-related products. These products cross multiple functional boundaries such as real-time collaboration, surveillance, signage, streaming video, and more. Cisco's combined expertise in both video and network technology gives the company a unique advantage in delivering high-quality, business-class video solutions.

“IP video will become a growing strain on the enterprise network—IT managers will be required to separate and classify video traffic in order to monitor, manage, and control traffic flows”.

Source: IDC

This paper introduces the major video technologies that are available today. It also provides some guidance concerning critical campus network foundation technologies required for the successful deployment of these video solutions.

A Choice of Rich-Video Technologies

Today businesses have access to an unprecedented variety of applications. Technology that was once available only to Fortune 500 companies is now available to businesses of all sizes. Some of the leading applications include desktop video, Cisco® TelePresence, surveillance, and digital signage.

Desktop Video

Desktop video lets you deliver rich, high-quality communication to any employee’s PC or laptop. You can stream live video over your IP network to broadcast executive communications, special events, internal corporate announcements, and other employee communication in real time. You can also employ two-way streaming video for desktop person-to-person video conferencing that is as easy to set up and use as a phone call.

Video on demand is another desktop application that is enjoying rapid adoption. With this application you can deliver prerecorded video programs such as corporate communications, training, and orientation directly to employee desktops.

Cisco Webex is one leading desktop application that supports a variety of streaming video services. This popular application facilitates impromptu point-to point-connections, multipoint video connections, event-center live streaming, and real-time video sharing. WebEx also supports rich-multimedia presentations through its Presentation Studio application.

Cisco TelePresence

Cisco TelePresence is an advanced video technology that creates a live, “face-to-face” experience over the network that lets individuals interact and collaborate with others like never before. This remote collaboration technology integrates advanced audio, high-definition video, and interactive elements with the power of the underlying network to deliver an immersive, in-person experience.

Collaboration with Cisco TelePresence makes interaction as natural and effective as in-person communication, because participants feel as though they are in the same room.

Surveillance

Video technology is a flexible medium that both improves communication and collaboration and enhances security. Many companies are migrating their aging analog video surveillance systems to IP-based video solutions. IP video surveillance is more cost-effective and scalable, and can also support a wide range of advanced applications.

Surveillance technology has evolved substantially with the introduction of motion-, heat-, and sound-detection sensors, as well as better image quality, transmission, storage, and video analytics.

Digital Signage

Digital signage is a centrally managed publishing solution for delivering compelling digital media to networked displays.

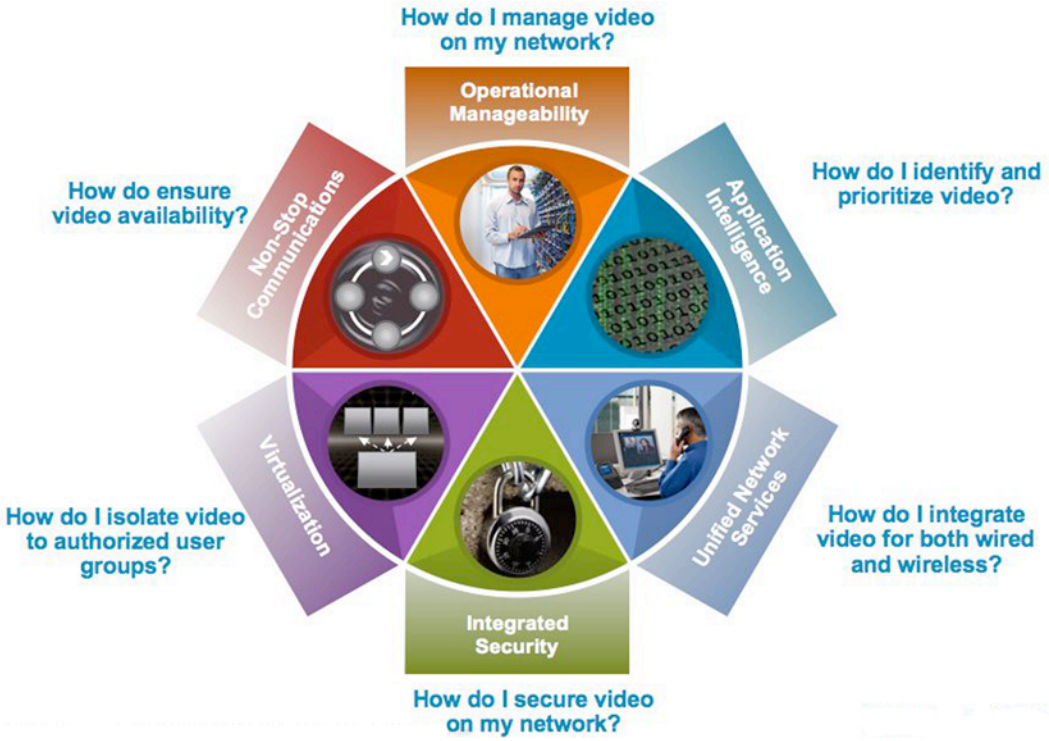
Digital signage is an excellent tool for marketing, helping companies to promote products and services directly to customers in the store. Digital signage is also a strong medium for broadcasting internal information; it can help companies share up-to-date schedules and news where people need it most, or provide real-time location and directional guidance.

Building a Video-Ready Campus Network

Companies are rapidly adopting this growing array of video applications to make their employees more collaborative and productive. At the same time, demands on the network are growing exponentially as users rely on increasingly media-rich applications on a daily basis. To prepare their network to accommodate new video applications, IT staff should align their networks with their business’ video requirements. Enterprises require a network foundation with intelligent network services to meet user expectations for a flawless quality of experience.

The Cisco approach to campus video communications centers on the Cisco Campus Communications Fabric, the underlying foundation for interactive, real-time networked applications. The Cisco Campus Communications Fabric delivers a framework for integrated network services that is essential to optimize, secure, and scale the campus network for rich, high-quality, real-time video application (Figure 1).

Figure 1. The Cisco Campus Communication Fabric: Addressing Campus Video Challenges



As critical components of the Cisco Campus Communications Fabric, Cisco Catalyst® switches deliver the integrated features businesses need to deploy secure, high-quality video applications. The following sections address some of the technologies required to ensure delivery of high-quality video.

Optimize

How do I ensure user service-level agreements (SLAs) while keeping video applications from overrunning my network?

Latency-sensitive video content can place significant demands on a business' network and the applications that it supports. To help provide the high-quality experience that users demand, Cisco Catalyst switches offer a comprehensive set of features to optimize the campus network for video:

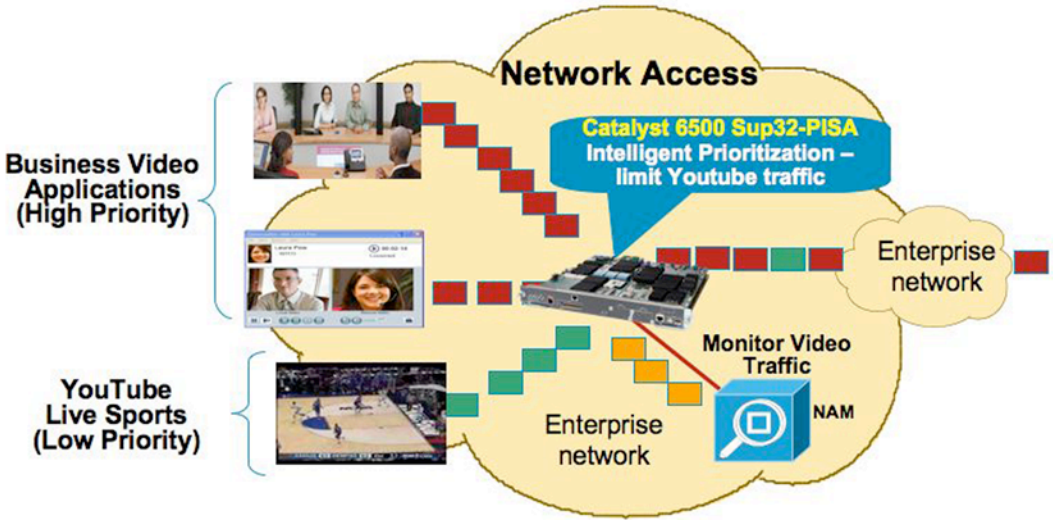
- **Quality-of-service (QoS)** mechanisms such as identifying, policing, queuing, traffic shaping, and congestion avoidance can help your organization deliver video without disrupting business-critical traffic. Video traffic is bandwidth-intensive and can congest the network. By implementing an appropriate QoS policy, IT can help ensure optimal delivery of video without affecting existing network traffic and applications.
- **IP Multicast** is a bandwidth-conserving technology that reduces traffic by simultaneously delivering a single stream of information to multiple recipients. This technology is ideal for video applications where the same large set of data or video must be transmitted efficiently to multiple clients.

What Is the Cisco Catalyst 6500 Supervisor Engine 32 Programmable Intelligent Services Accelerator?

The Cisco Catalyst 6500 Supervisor Engine 32 Programmable Intelligent Services Accelerator (PISA) is an intelligent services supervisor engine for the Cisco Catalyst 6500 Series modular switches that delivers superior deep packet inspection, application awareness, prioritization, security, and manageability services.

- **Application intelligence** provides deep packet inspection and application awareness, allowing IT staff to differentiate between business-critical video streams and noncritical streams. Your organization can apply application intelligence to help ensure that critical video applications get priority over downloads from YouTube. (Figure 2).

Figure 2. Optimizing Business Video Applications: Cisco Catalyst 6500 Supervisor Engine 32 PISA Identification and Prioritization



- **Network resiliency** at the network and system levels is also important in delivering the highest-quality user experience. Video is highly compressed, and therefore extremely sensitive to packet loss. For optimal performance, the network must support fast convergence with subsecond failover mechanisms to ensure minimal video stream interruption. Cisco solutions offer millisecond failover through industry-leading capabilities such as Virtual Switching System (VSS), In Service Software Upgrade (ISSU), and Nonstop Forwarding with Stateful Switchover (NSF/SSO).

How Does ISSU Benefit My Network Performance and Resiliency?

ISSU capabilities, available on Cisco Catalyst switches, can help your organization upgrade the complete Cisco IOS® Software image without having to take the switch or network out of service. ISSU helps ensure business continuity with an "always-on" network.

- **Proactive monitoring** and measuring of video performance gives organizations better visibility into how demanding applications affect the network, to ease network administration, maximize network resilience, and enable better planning. Cisco Catalyst switches include a variety of monitoring and measuring technologies and products, such as the Cisco Network Analysis Module (NAM), the multicast CiscoWorks LAN Management Solution (LMS) Manager, and CiscoWorks QoS Policy Manager (QPM) and IP service-level agreement (IP SLA), which allows customers to analyze IP service level for applications and services. Using this function, you can measure and perform network assessments and verify QoS to help ensure real-time video and voice traffic delivery.

What is NSF/SSO?

NSF/SSO facilitates rapid supervisor-engine switchover and continuous data forwarding during supervisor-engine switchover in the Cisco Catalyst 4500 and Catalyst 6500 modular switches.

Secure

How do I secure confidential video communications?

As video content supports more critical business communication, the need to safeguard video traffic is greater than ever. The network should give IT the ability to provide video-specific threat defense, enabling organizations to:

- **Authenticate and apply security policies to users to define and control video applications by users and groups:** Identity Based Networking Services (IBNS) harnesses the power of IEEE 802.1x to implement more stringent access controls for users.
- **Mitigate attacks and protect traffic from snooping and intrusion by malicious users:** The integrated security features of Cisco Catalyst switches provide for Dynamic ARP Inspection, Dynamic Host Configuration Protocol (DHCP) Snooping, and IP Source Guard to mitigate man-in-the-middle attacks and prevent interception of video streams.
- **Protect IP Multicast streaming from video "hijacking" and prevent malicious users from transmitting unauthorized video:** Cisco offers features such as Protocol Independent Multicast (PIM) Register to help secure IP Multicast video.
- **Offer network virtualization:** This feature provides segregation of video traffic from other services and applications—especially surveillance camera traffic—for a higher level of security.

Scale

How do I ensure my network can scale as the video traffic and applications increase?

As video becomes a critical part of business processes, its presence on the network will only grow, increasing demand on both bandwidth and system resources. To accommodate the continued growth of video applications, companies will need the ability to scale and modify their network foundations:

- **Network scalability** is critical to supporting increasing bandwidth demands as more video applications are deployed. To maintain optimal performance, the network should easily accommodate higher bandwidths, scaling to support Gigabit Ethernet to the desktop and 10 Gigabit Ethernet for uplinks into the core. A broad range of Cisco Catalyst switches support both Gigabit Ethernet and 10 Gigabit Ethernet, while delivering low-latency packet forwarding that video applications demand. The Cisco Catalyst 6500 offers an additional innovative feature called Virtual Switching that helps increase the total available bandwidth.

  What Is a Virtual Switching System?

  VSS is network system virtualization technology that pools multiple Cisco Catalyst 6500 Series Switches into one virtual switch, increasing operational efficiency, boosting nonstop communications, and scaling system bandwidth capacity to 1.4 Tbps.

- **For wireless solutions**, the 802.11n standard provides high bandwidth to mobile PCs, handheld devices, and other wireless devices to support business-quality video. Cisco Catalyst switches offer 20 watts of Power over Ethernet (PoE) per port to support these new 802.11n access points without requiring additional wiring or power outlets. To support higher-powered devices in the future, Cisco Catalyst 4500 Switches can support up to 30 watts per Ethernet port.

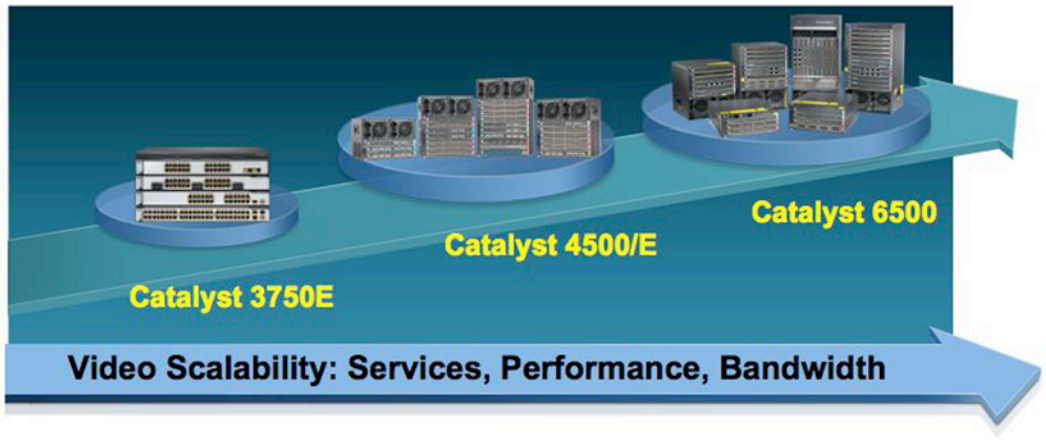
- **System scalability** is important to maintaining optimal performance for memory and processing resources (ternary content addressable memory resources [TCAMs]) in network switches. Enabling the previously mentioned optimization and security features for video can tax these system resources, so companies should select a switching platform that offers ample resources for the near future—as well as allowing for simple upgrades to increase performance and resources as needed.

Video applications can place new demands even on robust enterprise networks. However, with planning and focus on optimization, security, and scalability, organizations can build a solid foundation to support high-quality business-class video throughout the campus.

Cisco Catalyst Switches for Campus Deployment

Cisco offers a comprehensive range of switching solutions, supporting a wide variety of deployment requirements in campus networks of all sizes. Yet Cisco Catalyst switches are much more than a collection of point products to meet isolated IT needs; they are part of an integrated approach to the broader goal of optimizing, protecting, and scaling networks for years to come. Three important Cisco Catalyst switches for video deployment are the Cisco Catalyst 6500, Catalyst 4500, and Catalyst 3750-E Series (Figure 3).

Figure 3. Cisco Catalyst Switching Portfolio for the Campus



- **The Cisco Catalyst 6500 Series** is an innovative switching platform that delivers very high levels of integrated intelligent services and operational efficiency to meet the needs of most campus video-ready networks. The rich features, flexibility, and scalability of the Cisco Catalyst 6500 sets the standard for converged video, voice, and data networks. It offers industry-leading features such as QoS, IP Multicast Multiprotocol Label Switching (MPLS), system- and network-level resiliency, operational manageability, and application intelligence for maximum network optimization. Advanced security and scalability help enable the Cisco Catalyst 6500 to meet the video needs of organizations of all sizes.
- **The Cisco Catalyst 4500 Series** is a midrange scalable modular switching solution for converged access services, high resiliency, and operational simplicity in the campus wiring closet. The Cisco Catalyst 4500 offers extensive network edge intelligent services, including sophisticated QoS, multicast, and advanced security to optimize and secure not only video but voice and data in the wiring closet. High-resiliency hardware and software features help minimize downtime for planned and unplanned network outages.

- **The Cisco Catalyst 3750-E Series** is an enterprise-class line of stackable wiring closet switches that feature Cisco StackWise® Plus technology. This technology can help businesses build a unified, resilient stacking solution for the wiring closet. Cisco Catalyst 3750E switches offer advanced QoS, multicast, and security services that help video applications in the wiring closet.

Conclusion

The benefits of video technology are proven, and this innovative technology will continue to gain new features and build momentum in companies of all sizes. Businesses are making video applications an integral part of communications, collaboration, and cost-reduction efforts as they grow and extend their workforces across the globe.

Implementing high-quality video in the campus requires a network foundation that can be optimized, secured, and scaled. As critical components of the Cisco Campus Communications Fabric, Cisco Catalyst switches provide industry-leading intelligent services and features that businesses require to optimize, secure, and scale their networks to support the demands of video today—and well into the future.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV
Amsterdam, The Netherlands

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