Networking for E-Learning

Session 3102
Agenda

- Business Motivators
- E-Learning Application Profiles
- Network Considerations
- Cisco’s Network
- Summary
New World Learning Challenge

- Aging population
  65% of the U.S. population is over 40 years old

- Stagnant labor force growth
  2/3 of the present workforce will still be employed in the year 2020

- Escalating skill requirements
  80% of the present workforce will need retraining
  75% of net new jobs will be in the professional, technical, and managerial areas

“The shortage of skilled employees is not a distant threat anymore. Finding an adequate supply of qualified employees is the number one issue for American industry today.”

Earnest Davenport, Chairman National Manufacturers Association

Source: Understanding the Digital Economy
The E-Learning Advantage

E-Learning Gives Your Workforce the Ability to Turn Change Into an Advantage...

...the Ability to Know More, Learn Faster, at Less Cost

Evaluating the Return on Your Video Network Investment

- Examine costs
  - Moving people vs. data
- Measure costs over time
  - Cost per incident and number of incidents vs. deployment costs
- Identify success factors
  - Payback of 50% or more
  - Effectiveness and productivity
- Cost of waiting

Application Examples

Training for the Field
- Streaming media
- 3053% ROI over four years
- More effective than CD-ROM

Business Meetings for Sales
- Videoconferencing
- 1429% ROI over four years
- Increased yearly sales by 15%

Consider Your Own Business
We Want to Run Video

A lot of qualification must go behind this statement—understanding the many video applications, their behavior, and their affect on the network
E-Learning Applications

- Training
  Individually paced classes
- Business meetings
  Interactive distance learning
- Corporate communications
  Large classes

How Do You Deliver Network Video?

- Broadcast Video (Scheduled)
  One-Way, One-to-Many (Push Model)
  Bandwidth: One Stream to Unlimited Users (IP Multicast)

- Video-on-Demand (VOD)
  One-Way, Point-to-Point (Pull Model)
  Bandwidth: One Stream per User

- Videoconferencing (VC)
  Live Two-Way, Small Groups
  Bandwidth: One+ Streams per User
### Applications by Delivery Models

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### Applications by Interactivity and Audience Size

- **Telemedicine**
- **Distance Learning**
- **Business Meetings**
- **Customer Support**
- **Training**
- **Kiosks**
- **Surveillance**
- **Briefings**
- **Corp. Comm.**
- **Desktop TV**

![Diagram showing interactivity and audience size relationships]
Business Meetings
Interactive E-learning

- Reduce travel with regular virtual team meetings
- Use of data, voice, and video collaboration
- Gateway to tie into existing ISDN networks

Cisco IP/VC Solution

Cisco IP/VC Videoconferencing Products
Cisco IP/VC Product Family

- Cisco IP/VC 3510
  Multipoint Control Unit
- Cisco IP/VC 3520, 3525
  H.320 to H.323 gateways
- Cisco IP/VC 3530
  Video terminal adapter
- Cisco Multimedia Conference Manager
  H.323 Gatekeeper/Proxy

Corporate Communications
Large Audience E-Learning

- Deliver important messages quickly to employees
- Use of IP multicast to conserve bandwidth and increase quality
- Repeat broadcast to reach a larger audience
Online Training

- Deliver quality training quickly
- Schedule video broadcasts with video on demand (VoD)
- All classes taken at desktops

Multicast Advantages

Example: Video Streaming
All Clients Viewing the Same 800 kbps Video

- Efficient and scalable information delivery
- Network cost savings
- Network enabled for new e-learning applications
Cisco IP/TV Video Solution

Cisco IP/TV Control Server

Cisco IP/TV Broadcast Server Cluster A

Cisco IP/TV Archive Server Cluster B

Cisco IP/TV Archive Server Cluster C

WAN

Satellite or Cable TV
Camera
Taped Presentations

Cisco IP/TV Viewerset 1
Cisco IP/TV Viewerset 2
Cisco IP/TV Viewerset 3
Cisco IP/TV Viewerset 4

Cisco IP/TV Video Solution

Cisco IP/TV Product Family

- Cisco IP/TV 3411 Control Server
- Cisco IP/TV 3422/3423 Broadcast Servers
- Cisco IP/TV 3431 Archive Server
- Cisco IP/TV Viewer
Network Considerations

New World E-Learning

Data

Voice

Video

The User
Why IP Based Solutions?

- Why IP based anything?
  Networking 1001 and the OSI Model
  Layer three protocols divorce connection control from media

- Solve the problem on IP, solve the problem for the foreseeable future

- Only software rev’s at first
  Hardware to scale up capacity

Heterogeneous Technologies...

802.1p
ISL COS
MPLS COS
ATM UNI
FUNI
WAN/SP/Telco
COS
QoS

Campus

Desktop: E, FE, TR, ATM
Backbone: E, FE, GE, ATM, Optical
LL, FR, ISDN, MPLS, ATM, SDH

...Homogeneous Networking

IP TOS
IP
Diffserv
RSVP
Intserv

...
QoS for E-Learning

- Network-wide QoS solution
  - Prioritize mission-critical traffic
  - Bandwidth assure video applications
  - Prevent unauthorized applications

Letting Video Get Ahead

- Configurable Queues
  - Two 100 Byte Video Packets
  - One 1500 Byte Data Packet

- Classify
  - Interface Buffer Resources

- De-queue
  - Video Packets Given Priority and Transmitted Ahead of Data Packet

- Transmit Scheduling

- Flow Classification/Sorting
  - Source and destination address
  - Protocol
  - Session identifier (Port/Socket)

- Weighted Fair Scheduling
  - Requested QoS (IP Precedence, RSVP)
  - Frame Relay FECN, BECN, DE
  - Flow throughput (Weighted-Fair)
QoS Enforcement Mechanisms

- Admission Control
- Congestion Management
- Congestion Avoidance
- Traffic Shaping

- CAR Committed Access Rate
- RSVP Resource Reservation Protocol
- WFQ/CBQ Weighted Fair Queuing
- CQ/PQ Custom/Priority Queuing
- WRED Weighted Random Early Detection
- GTS FRTS Traffic Shaping

IP QoS Over ATM

- ATM VC’s on a per flow basis
  Negotiated by RSVP

- ATM VC’s on a class basis
  Sorted by IP precedence or arbitrarily by access control lists

- Single ATM VC’s
  If VC count is a problem, single VC with CBWFQ service policy
IP QoS Over Frame Relay

- Frame Relay traffic shaping
  The router has to know how much bandwidth you really have

- WFQ
  Shares bandwidth fairly across applications based on current flow count and IP precedence

- IP Precedence/RSVP
  Intentionally skew the fairness according to policy

IP QoS Over Ethernet

- 802.1p
- Map IP precedence/DSCP to 802.1p bits
- Map RSVP to a DSCP or IP precedence value
Why Cisco for Video Over IP?

- High quality
- High availability
- Rapid deployment
- Interoperability
- Investment protection
- Flexible communications
- Intelligent network services
  - Quality of service
  - IP multicast
- Network management for video
- Open, standards based
- SMARTnet™
- Migration paths
- Videoconferencing, broadcasting, and on-demand video

The Cisco Advantage

- Architecture
  - Product Technology Leadership
  - Intelligent Network Services
  - End-to-end Solution
- Expertise
  - Market Leader Experience
  - Internet Solutions Best Practices
  - World Class Service/Support
- Ecosystem
  - Open Systems
  - Partnerships
Cisco E-Business Solutions Framework

- Workforce Optimization
- Supply Chain Management
- E-Commerce
- Customer Care
- E-Learning

- Availability
- Cisco IP Fabric
- Scalability

- Intelligent Network Classification
  - Voice
  - QoS
  - Security
  - Multicast
  - Load Balancing
  - Address Management
  - Accounting
  - Monitoring

- Partnerships
  - Device and Policy Config
  - Directory

Cisco E-Business Solutions Framework

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Cisco’s Network

Case Study: Cisco

- Cisco IP/TV
- All US offices
- Corporate Communications
- Product launches
- Quarterly reviews
- Training (live and recorded)
Cisco Campus Network

Network Details

- Dedicated Ethernet/Fast Ethernet per user
- Catalyst 5500 switches
- Fast Ethernet and ATM backbone
- 1.2 Mbps video streams for training and communication
- Multicast support on switches and routers

Cisco Domestic WAN Network

- Minimum 256 kbps Frame Relay circuits
- 100 kbps video streams
- Multicast video streams to remote offices
- QoS to assure bandwidth of video applications
Summary

- Continuous training and information sharing is a requirement
- Effective information delivery implies a variety of tools
- IP is the common transport which future-proofs your delivery solutions
- Smart network infrastructure is the key to successful delivery
Planning an E-Learning Network

- Identify video technologies to meet e-learning requirements
- Enable IP multicast on network
- Match network bandwidth with application quality needs
- Provide quality of service
Please Complete Your Evaluation Form

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