Video Technologies & Solutions Track

Fabio Ganzaroli (fganzaro@cisco.com)
Video Solutions Lead
Enterprise & Midmarket Customer Segment
European Markets

Agenda

- Cisco Video Strategy
- Video Concepts
- Digital Media System Services
- Network Video Architectures for Digital Media

Cisco Video Strategy

Enterprise Video
Key Technology Trends and Implications

From LD to HD Video

Explosion of Content Originators & Producers

Comm's Integration

Universal Access Demand

Enterprise Video

Organizations fundamental challenges

Challenge 1: Customer Experience

How can we provide superior customer experiences?

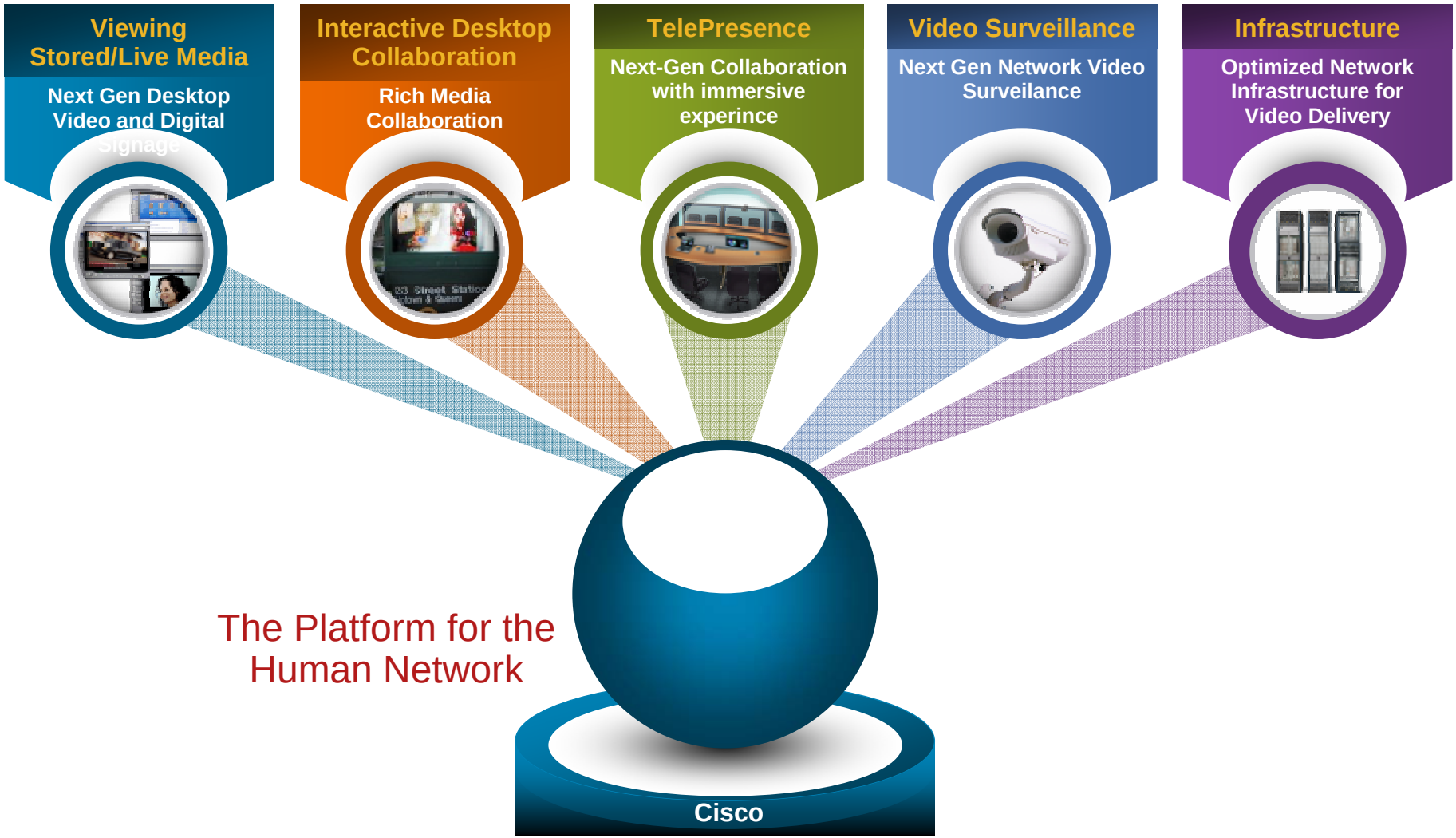
+

Challenge 2: Productivity

How can we secure a borderless and productive organization?

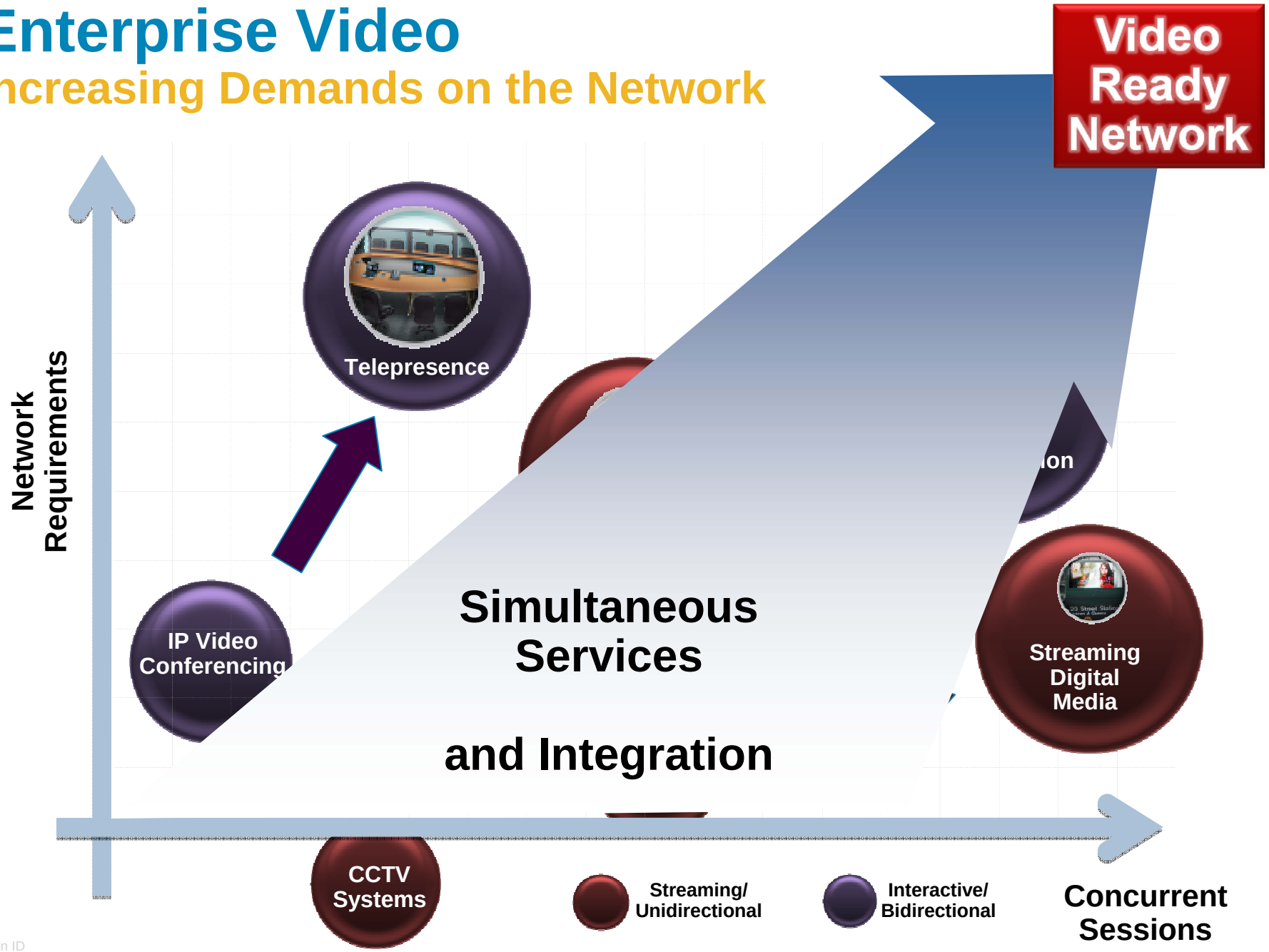
Meanwhile being "Green"

Enterprise Video Applications



Enterprise Video

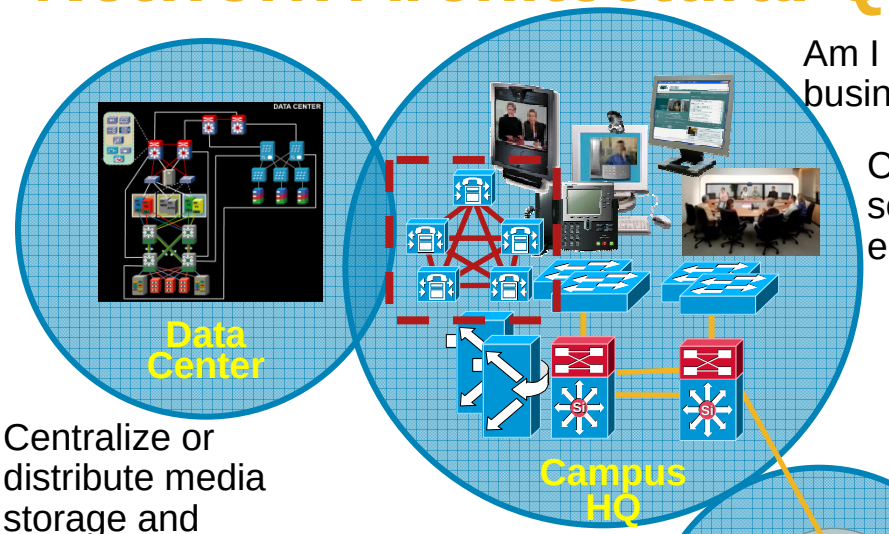
Increasing Demands on the Network



Enterprise Video Challenges
Video…"Tip of the Iceberg"

Enterprise Video Challenges

Key Network Architectural Questions



Am I meeting user and business needs?

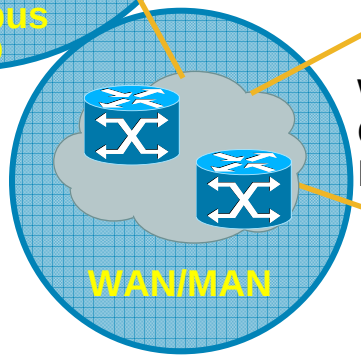
Can I consolidate some of my video equipment?

Centralize or distribute media storage and conferencing services?

Can I do Business-to-Business Video?

What are the security considerations?

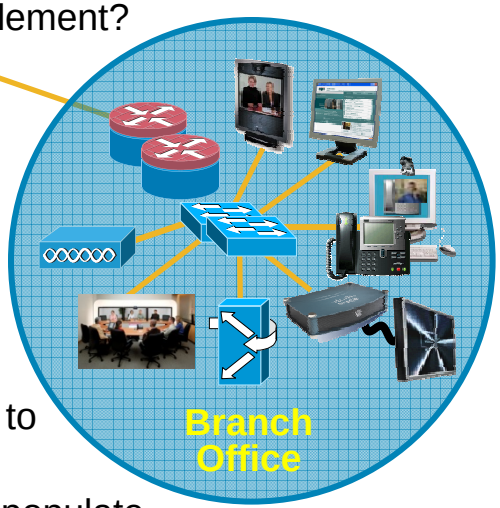
What about dial plans?



What Admission Control should I implement?

What are the security considerations?

Can I deliver video to any device, including mobile devices?



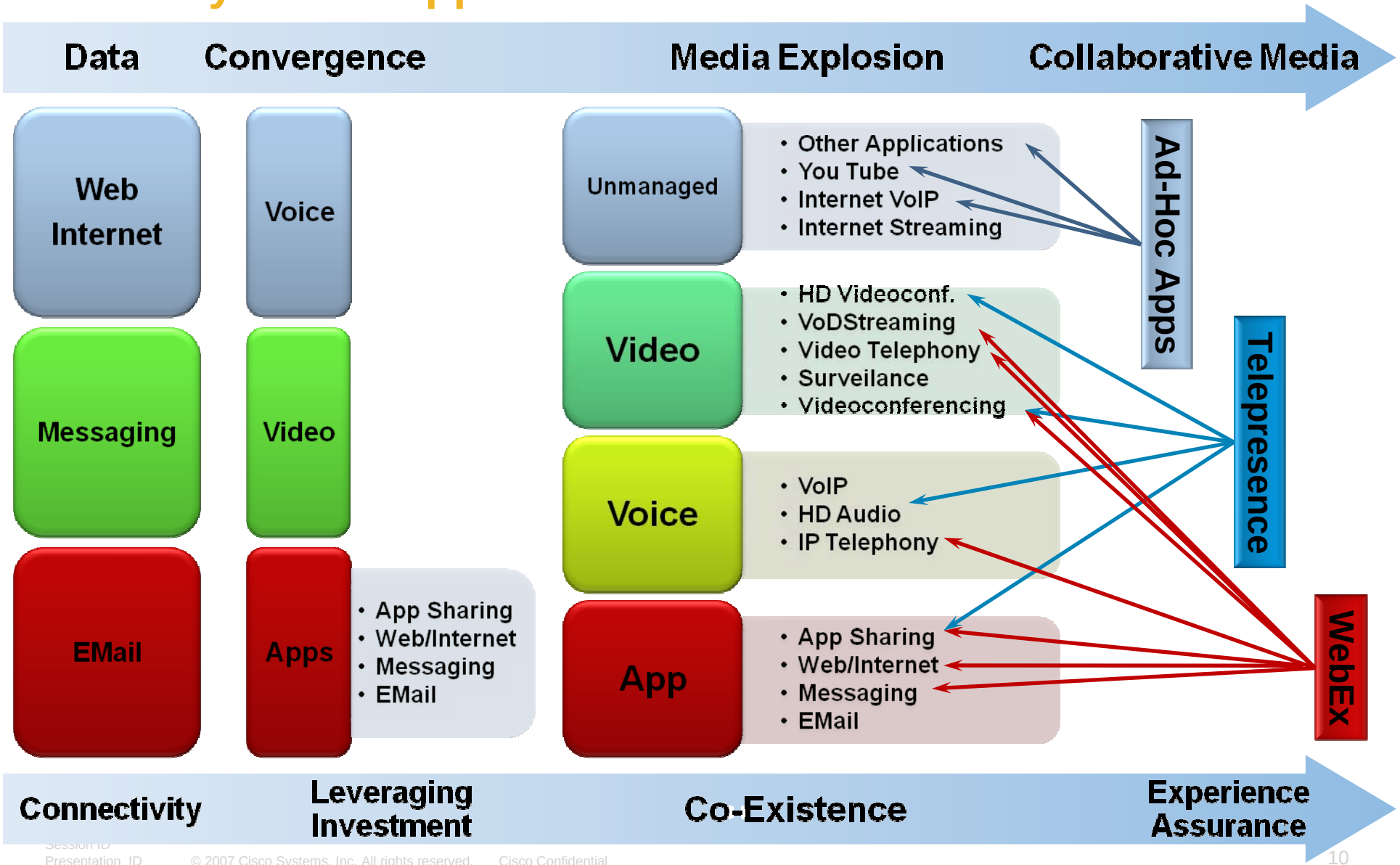
Which video applications have highest priority?

How to deliver video to remote locations?

Should I pre-populate content?

Enterprise Video Challenges

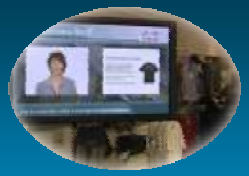
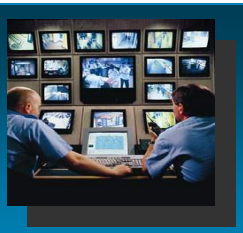
Many Media Applications on the Network



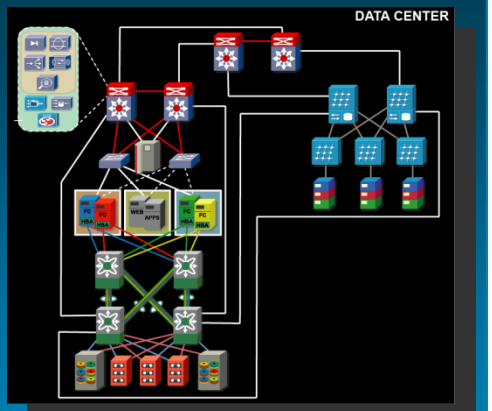
Video Ready Network

Enabling Enterprise Video Services

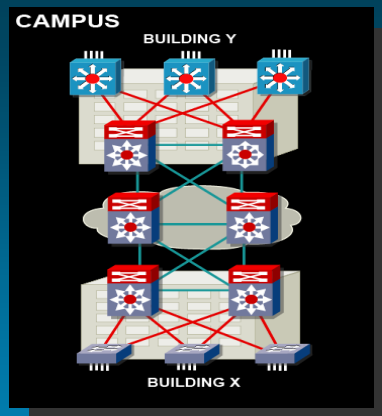
Insuring the Experience

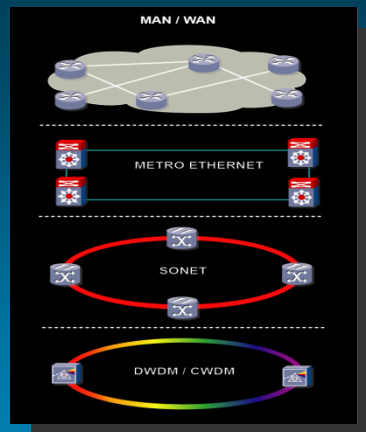

Video Solutions

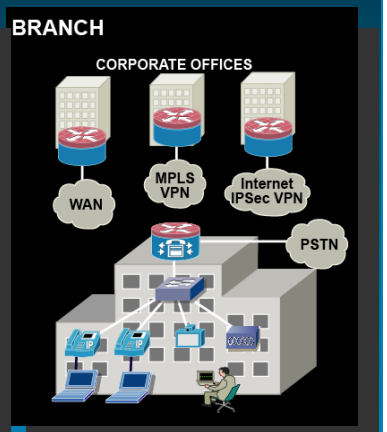


Data Center Applications Delivery Fabric



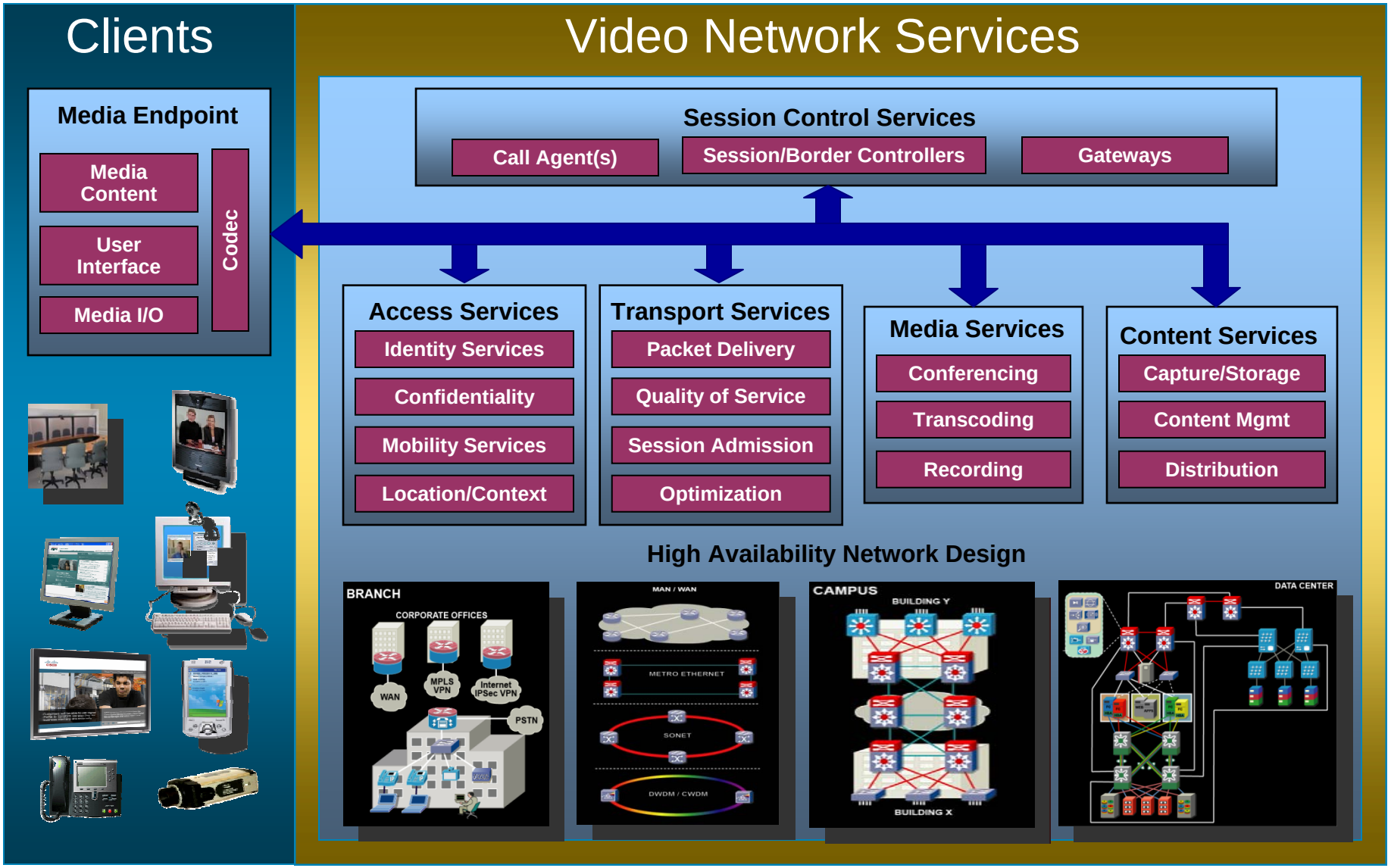
Campus Communications Fabric





Branch and WAN Services Fabric

Video Ready Network
Architecture



Cisco is just leading this…

- Network Video Fabric
  - Granular QoS
  - Multicast
  - Streaming Infrastructure
  - Performance Routing
  - IPSLA
- Video solutions as a combination of Applications, Network Services and Clients

Video Concepts

Video

CODECs (CODe/DECode)

	Application	Bandwidth	
MPEG1	VCR	0.5 to 1.5Mbps	Motion Pictures Expert Group
MPEG2	VCR-HDTV	1.5 to 20Mbps	
MPEG4 P.2	Internet-VCR	64Kbps to 4Mbps	
MPEG4 P.10	Internet-HDTV	500Kbps to 12Mpbs	
H.261	Video Conferencing	N x 64Kbps	ITU
H.263	Video Conferencing	32Kbps to 2Mbps	
H.263+	Internet	24-64Kbps	
H.264 AVC	Internet-HDTV	500Kbps to 12Mbps	
H.264/M	3G Mobile	64-128Kbps	
Microsoft™	Internet-HDTV	128Kbps to 15Mbps	
Real™	Internet-HDTV	64Kbps to 8Mbps	
Sorenson™	Internet-DVD	128Kbps to 15Mbps	

Video
Protocols

- Announcement
  - Session Description Protocol (SDP RFC2327)
  - Windows ASX, WSX, NSC
  - Real RAM
- Request
  - Real-Time Streaming Protocol (RTSP RFC2326)
- Transport
  - UDP
    - Real-Time Transport Protocol (RTP RFC1889)
  - TCP
    - HTTP (progressive download)

Classification and Marking Design: RFC 4594

Configuration Guidelines for DiffServ Service Classes

Application	L3 Classification		IETF
	PHB	DSCP	RFC
Network Control	CS6	48	RFC 2474
VoIP Telephony	EF	46	RFC 3246
Call Signaling	CS5	40	RFC 2474
Multimedia Conferencing	AF41	34	RFC 2597
Real-Time Interactive	CS4	32	RFC 2474
Multimedia Streaming	AF31	26	RFC 2597
Broadcast Video	CS3	24	RFC 2474
Low-Latency Data	AF21	18	RFC 2597
OAM	CS2	16	RFC 2474
High-Throughput Data	AF11	10	RFC 2597
Best Effort	DF	0	RFC 2474
Low-Priority Data	CS1	8	RFC 3662

IP SLA for Digital Media

- Delay:

  VOD: No impact due to the service nature itself

  Live: No impact. Will not disrupt the conveyed message.

  Too high will lower user experience (start of a video or change between videos)

- Jitter:

  If too high (seconds) lead to buffer overflows → packet leakage → artefacts/"blacks"

  If sub-second player will leverage its buffer. Most players buffer could be tuned

- Packet loss:

  < 0.1%

  > 0.1% lead to artefacts and "blacks" (lost of key frames)

  Some codec's are quite robust in packet loss recovery (i.e. WMT 9+).

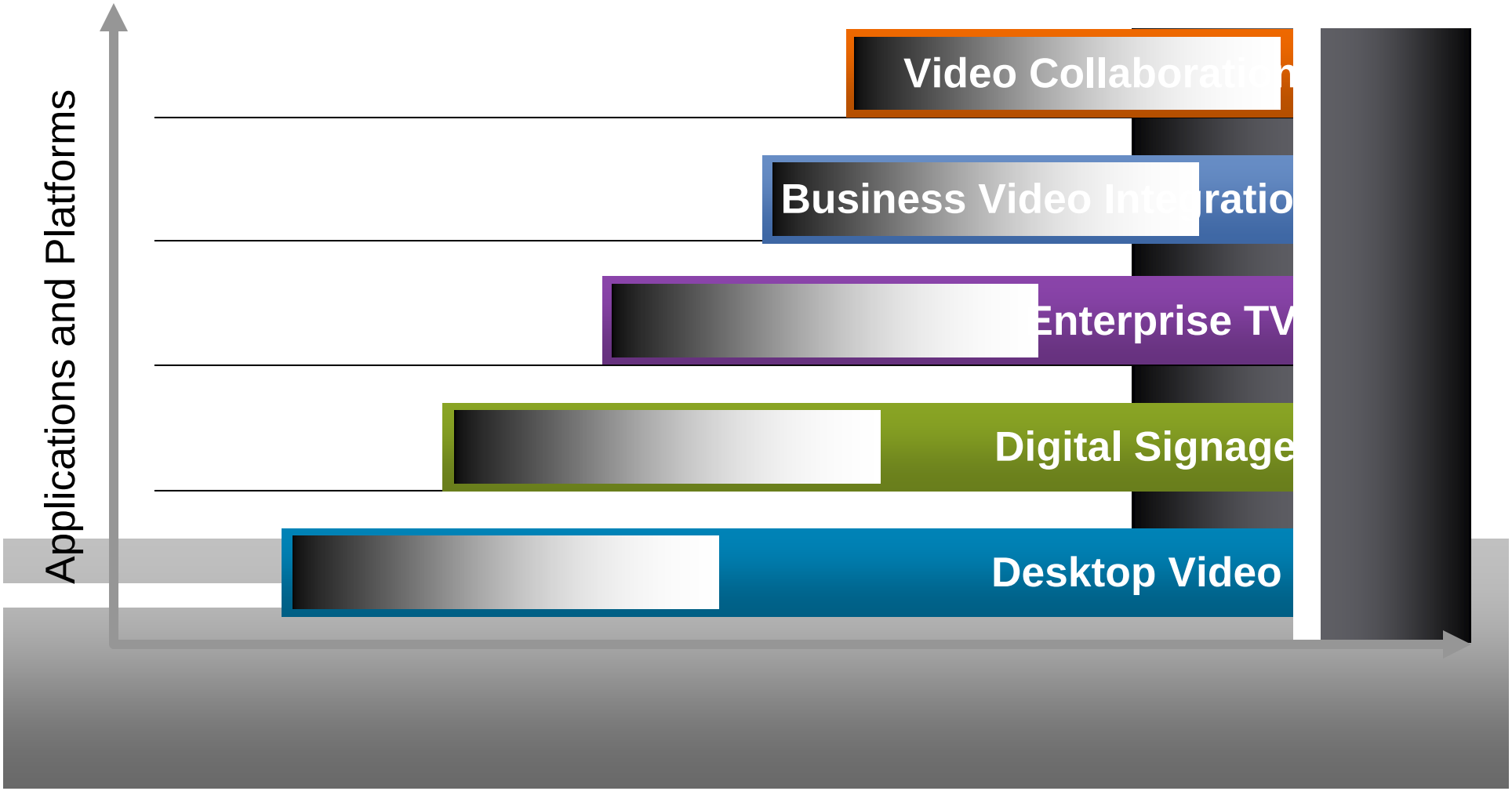
Enterprise Video

Understanding Diverse Application Models

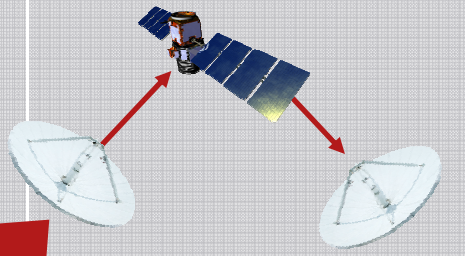
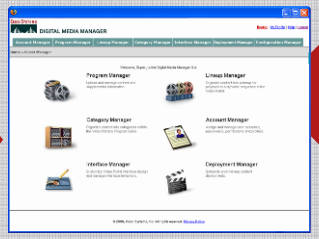
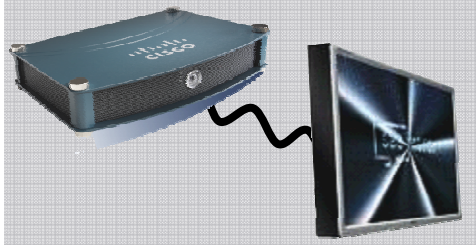
		Model	Direction of Flows	Traffic Trends
Streaming	Viewing Stored/Live Digital Media	Few to Many	Storage→Client Source→Client	Tremendous increase in applications driving more streams Demand for higher quality video increases each stream
Streaming	Video Surveillance	Many to Few	Source→Storage Source→Client	IP convergence opening up usage and applications Higher quality video requirements driving higher bandwidth (up to 8Mbps per camera)
Interactive	Interactive Desktop Collaboration	Many to Many	Client <-> Client MCU <-> Client	Collaboration across geographies Growing peer-to-peer model driving higher on-demand bandwidth
Interactive	Telepresence Collaboration	Many to Many	Client <-> Client MCU <-> Client	High-def video requires up to 15Mbps per location Expansion down to the individual user

Digital Media System Services

Cisco Digital Media Applications and Vision



End-to-End Cisco Digital Media
Desktop Video and Digital Signage

Media Capture/Creation	Media Management	Media Delivery & Distribution	Media Access
Cisco Digital Media Encoders	Content Author	Multicast-Enabled WAN: Satellite	**Cisco Video Portal**
			
3rd Party Content Provider/ Creative Agency		**Cisco NM-VSAT for the ISR**	Corporate Offices, At-Home Desktop Users
	**Cisco Digital Media Manager**	**Unicast or Multicast WAN**	**Cisco Digital Media Players**
		**Cisco WAE's** Caching/Pre-Positioning, Live Streaming	
Scientific-Atlanta Encoders	Network Administrator		On-Premise, Remote Location

Cisco Digital Media Encoders
Capture/Encode Video and Audio Feeds

DME 2000 Features

- Studio-level, dual channel encoding appliance
- Ideal for corporate offices or data centers
- Live encoding/transcoding of media into standard formats (WMV, Flash, H.264, etc.)
- Local or remote management

DME 1000 Features

- Portable, lightweight, single channel encoder
- Ideal for outdoor, classroom, and conference room use
- Support for all standard video formats
- Encodes video onto iPods
- Local or remote management

Desktop Video Service Overview

Streaming Server

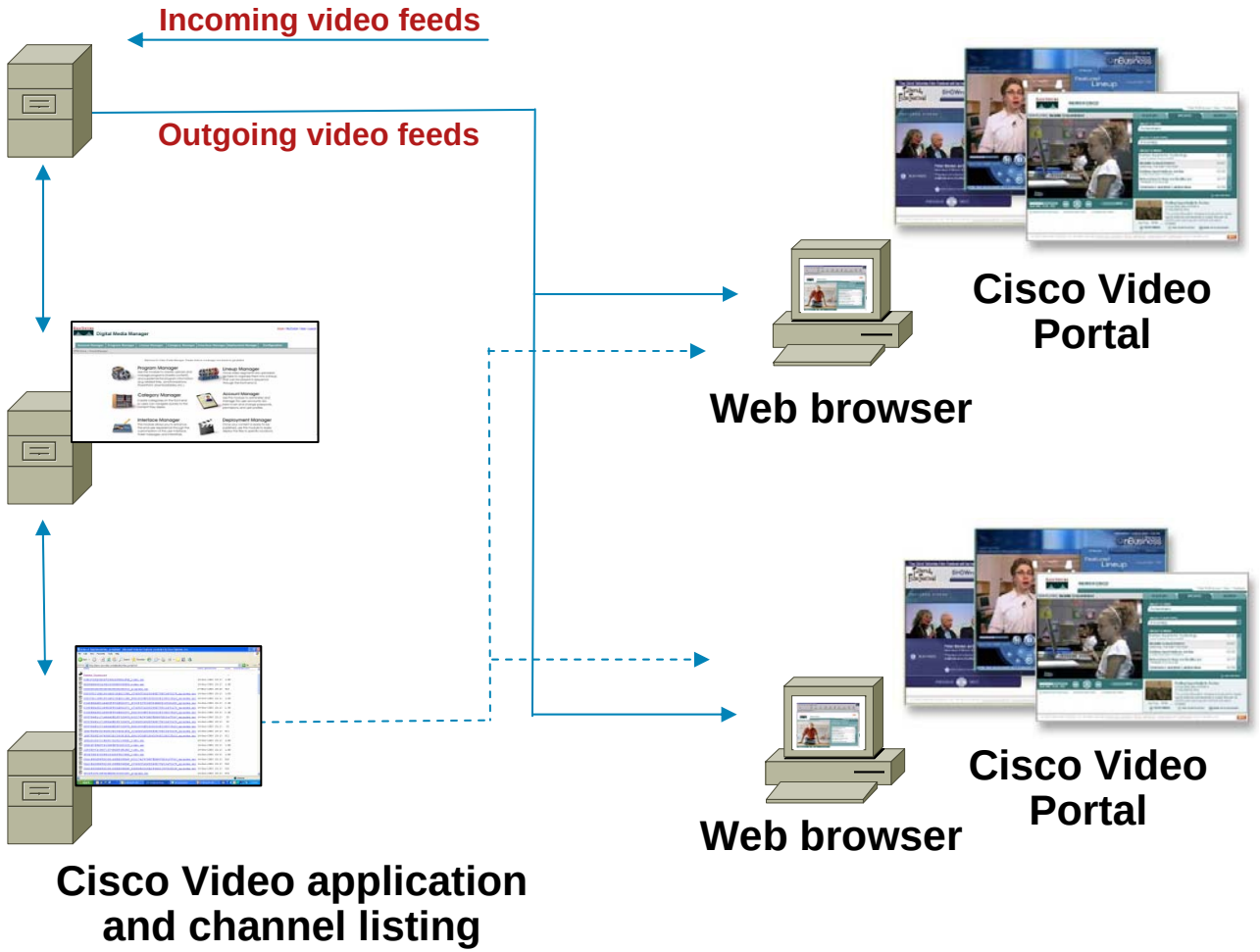
Receive video data and re-publish to Cisco Video Portal clients

Cisco Digital Media Manager

Administration of digital media channels and content publishing, Cisco Video Portal look-and-feel

Cisco Video Portal Server

Hosts Flash-based Cisco Video Portal, digital media channel listings and usage reporting tool



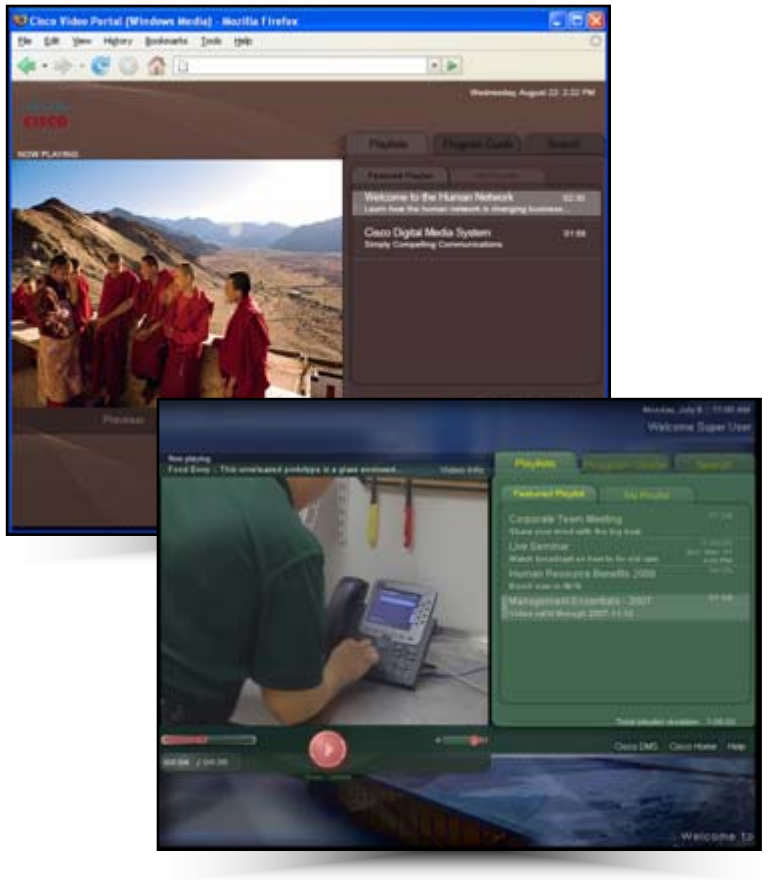
Cisco Digital Media Manager for Desktop Video
Centralized Digital Media Management and Publishing

- Robust, Web-based content management features
  - –Add, catalogue, and archive media
  - –Preview content and manage approval workflow
  - –Schedule instant and future deployments
- Flexibly, remotely publish content to Cisco Video Portal endpoint
- Easily customize Cisco Video Portal interface
- Live Event Module allows for slide synchronization and Q&A
- Active Directory and LDAP integration
- Cisco ACNS for optimized network delivery

Same Application for Managing and Publishing Cisco Digital Signage Content

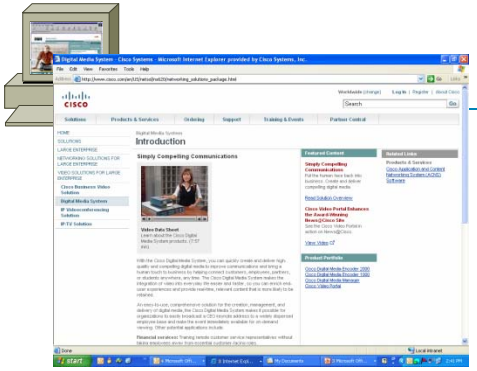
Cisco Video Portal
Easy Access to Digital Media

- Customizable interface, program guide and search
- Personalized playlists and featured lineups
- Advanced player controls
- View synchronized slides
- Submit questions during live events
- Fully integrated with Cisco DMM and Video Portal reports
- Login and authentication through DMM
- Supports major formats: Windows Media, Flash, H.264, QuickTime



Customize the Look and Feel to Reflect the Organization Brand with the Digital Media Manager

Day in a “User-Click” Life



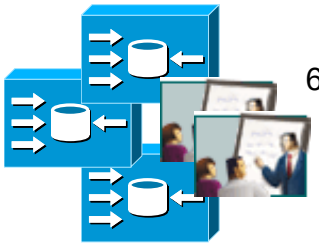
Intranet WebPage

1 – Request from Client

4 – Portal Browsing

3 - **Video Portal Web Application**

7 - Playback

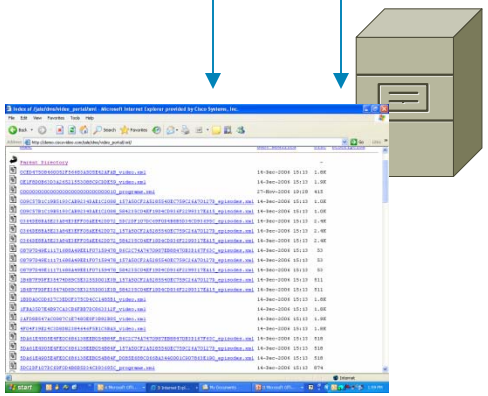


Streaming Servers

6 – Video Request

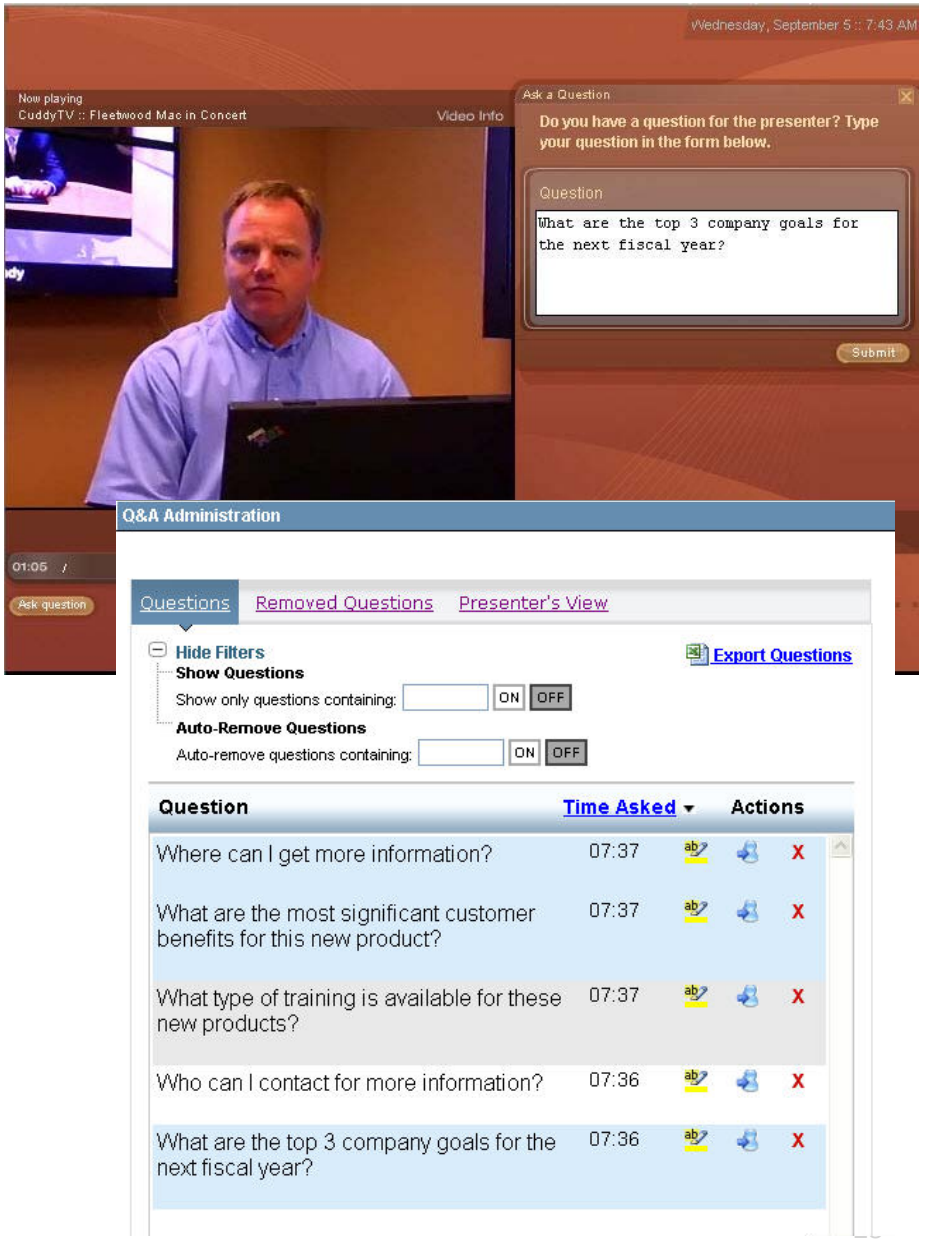
3 – Serves Main Front End

5 – Serves Portal Browsing Request

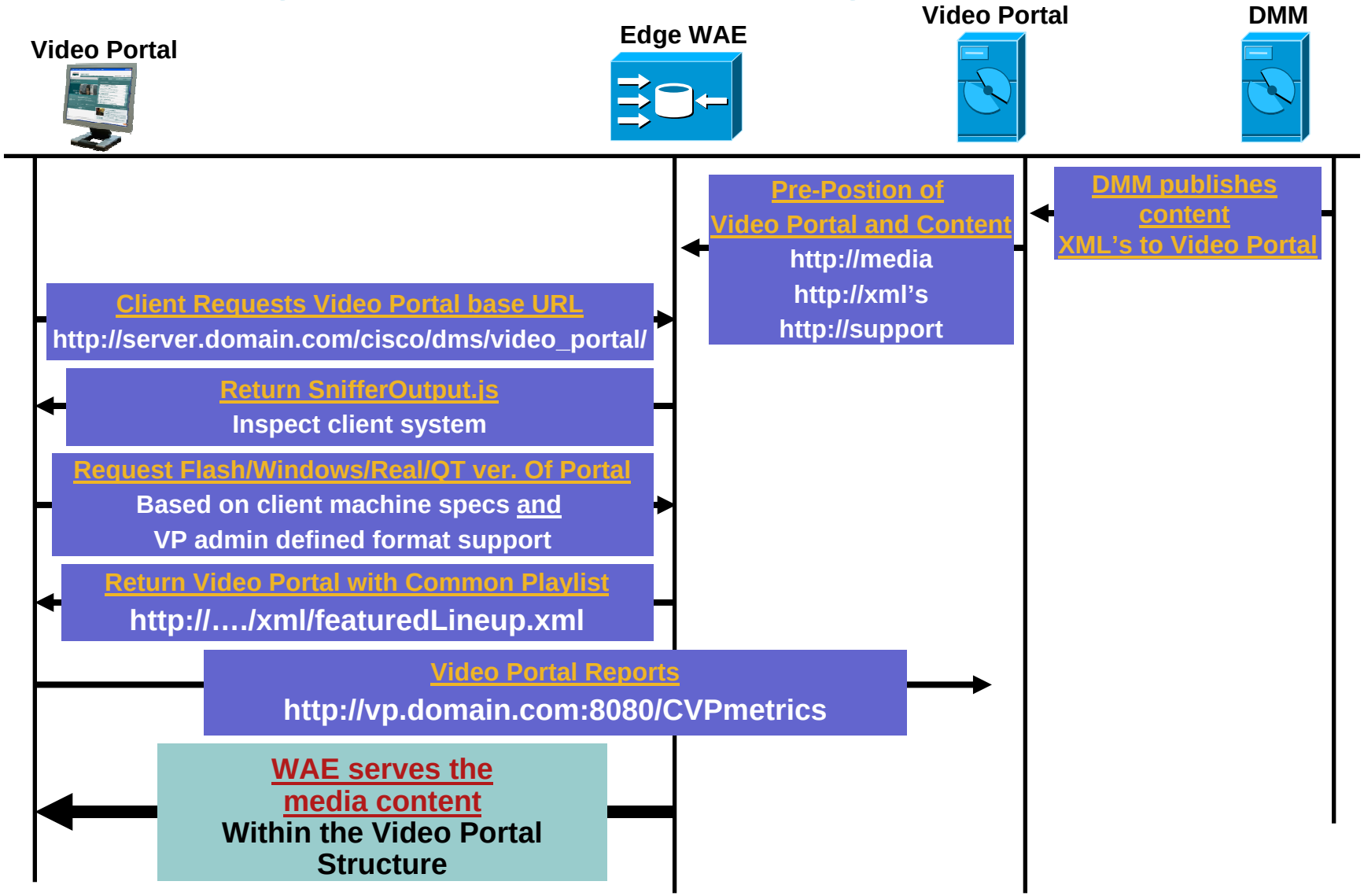


2 - **Video Portal Server check Client Capabilities**

Video Portal with Slides & Questions



VoD High-Level Flow Diagram



Digital Signage: The Basics

Digital Display

Rich Media Content

Media Player

Media Management

Network

Digital Signage Technology Evolution

Yesterday:
High Operational Costs, Low Flexibility

Today:
High Reliability and Flexibility, Easy Deployment and Operations

Tomorrow:
Video Surveillance, RFID, Cisco TelePresence, etc.

Technology Evolution → **New Opportunities**

Phase 1:
Standalone PC-Based

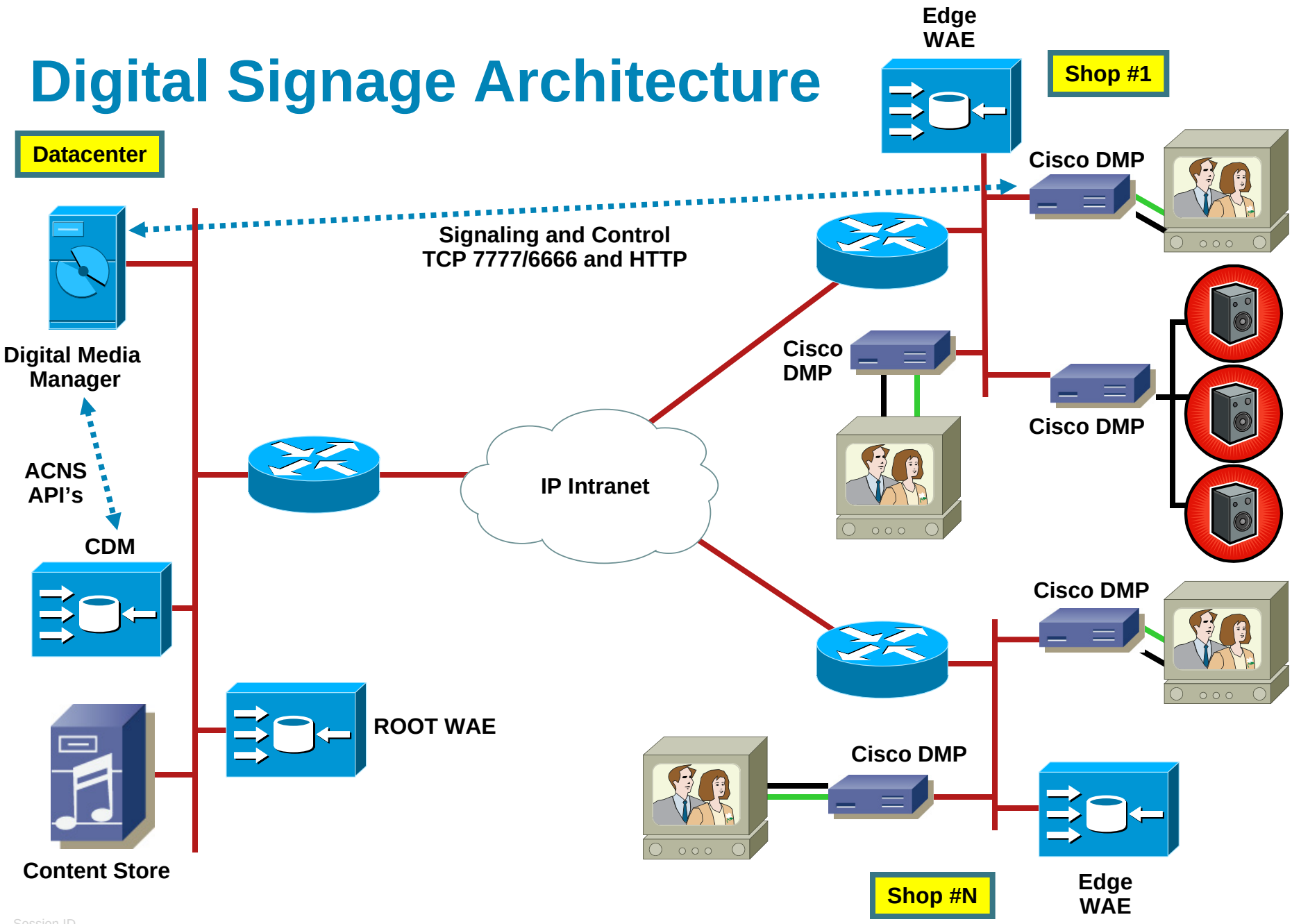
Phase 2:
Networked PC-Based

Phase 3:
Networked Media Player-Based

Phase 4:
"Smart" Signage

Digital Signage Market

Digital Signage Architecture

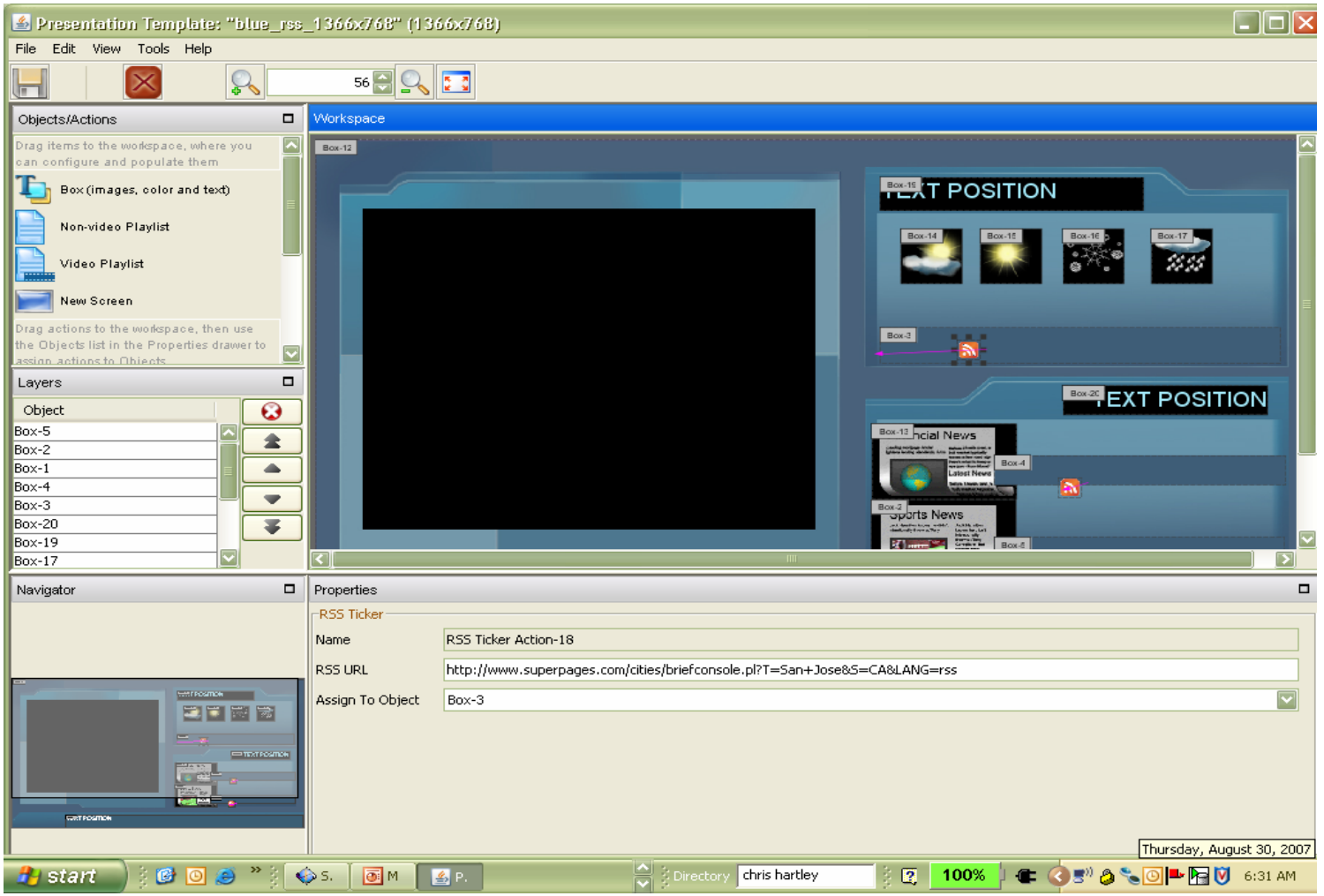


Cisco Digital Media Manager for Digital Signage
Centralized Digital Media Management and Publishing

- Web-based media management and publishing
- DMP discovery, configuration, grouping, management, reporting
- Create/design screen layouts and zones, manage playlists and schedule/update content
- Remotely control digital sign properties—on/off, contrast, brightness and volume
- Integrates with Cisco ACNS for optimized WAN delivery
- Role-based access control for users

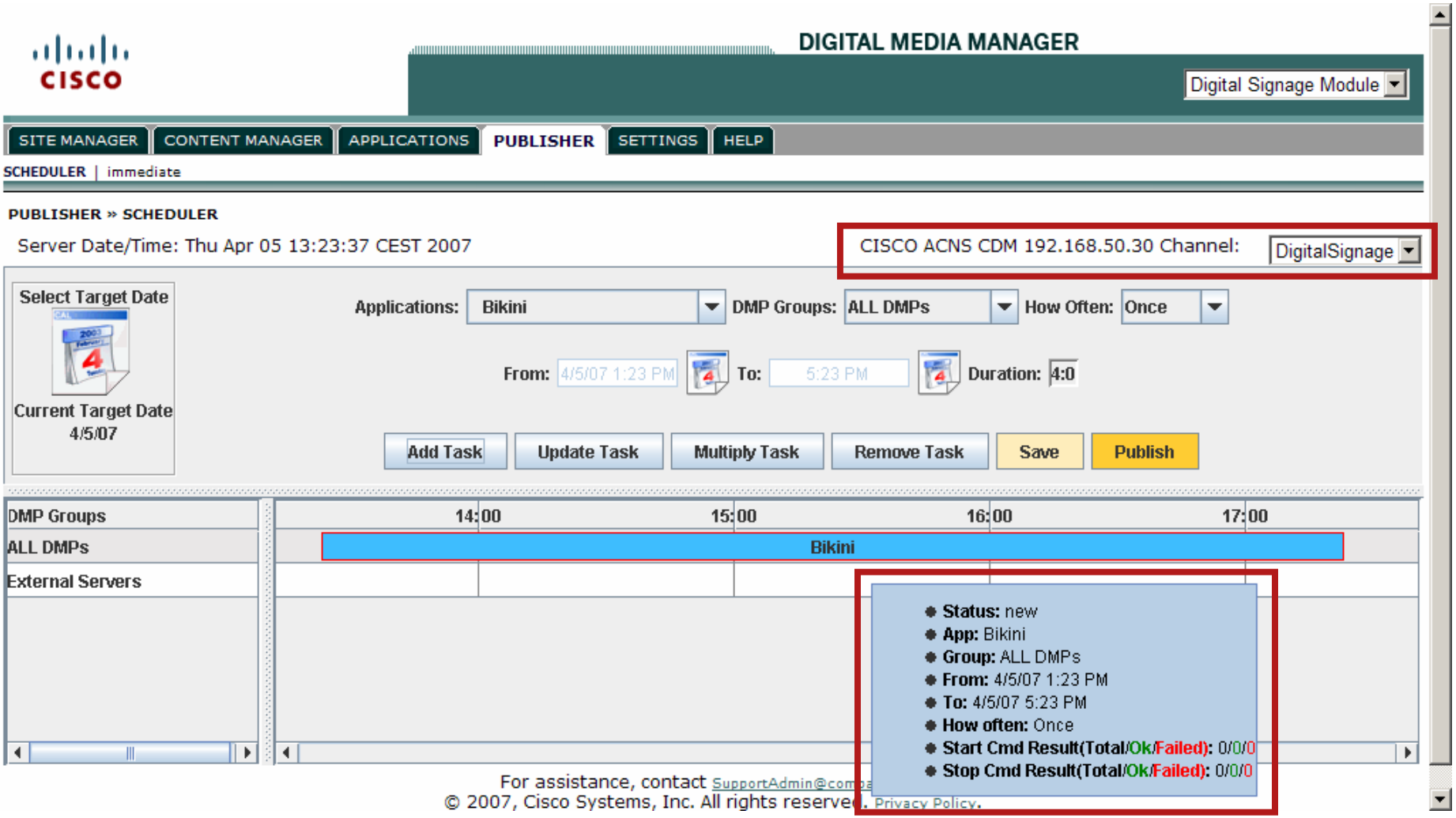
Same Application for Managing and Publishing Cisco Desktop Video Content

Designer for Digital Signage

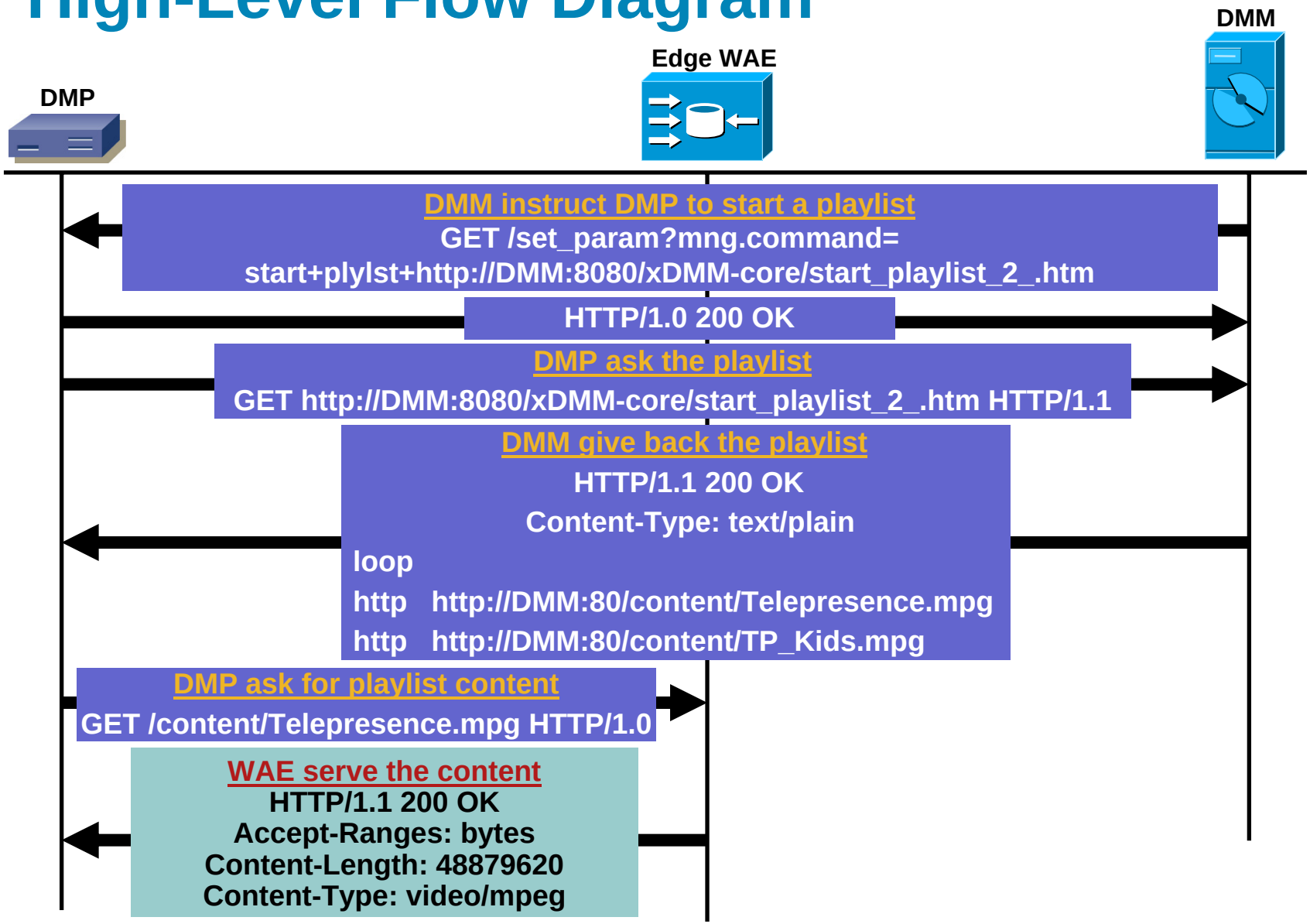


Videos, Flash, RSS and Static tickers, Playlists, Images, Logos, Icons and Customizable text

Scheduling and Publishing

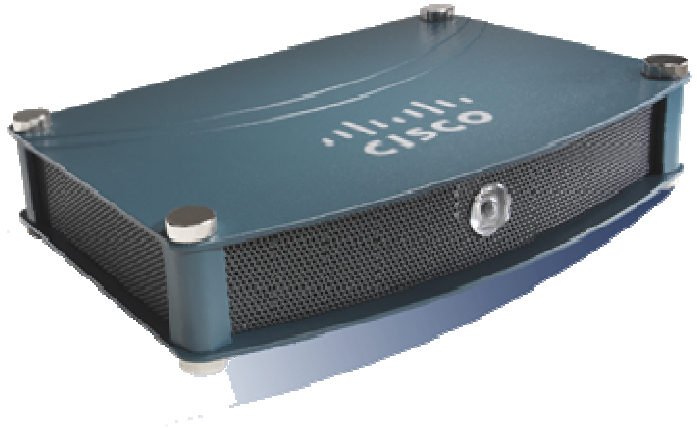


High-Level Flow Diagram



Cisco Digital Media Player
Playback of Compelling Digital Media Content

- Controls graphics, Web content, text tickers on screen
- Supports full-screen or “zone” video in SD or HD resolutions
- Customizable on-screen templates
- Remote management of display properties
- IP-network addressable
- Local storage, high availability, automatic failover
- Small and lightweight
- Low power and high reliability
- Security: Hardened device

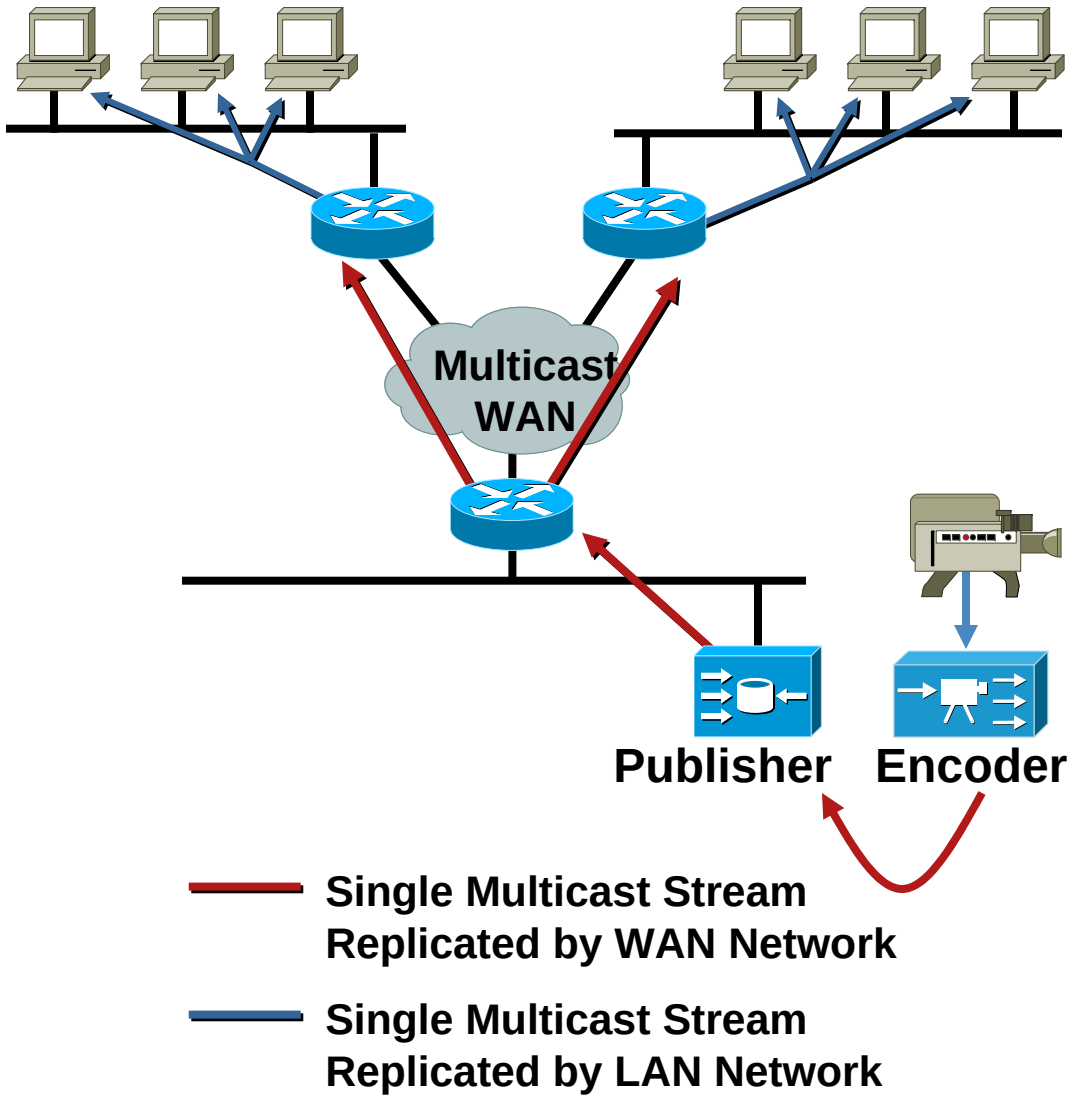


Small Form Factor:
7.5” x 5” x 1.5” at 1 lb.

Network Video Architectures for Digital Media

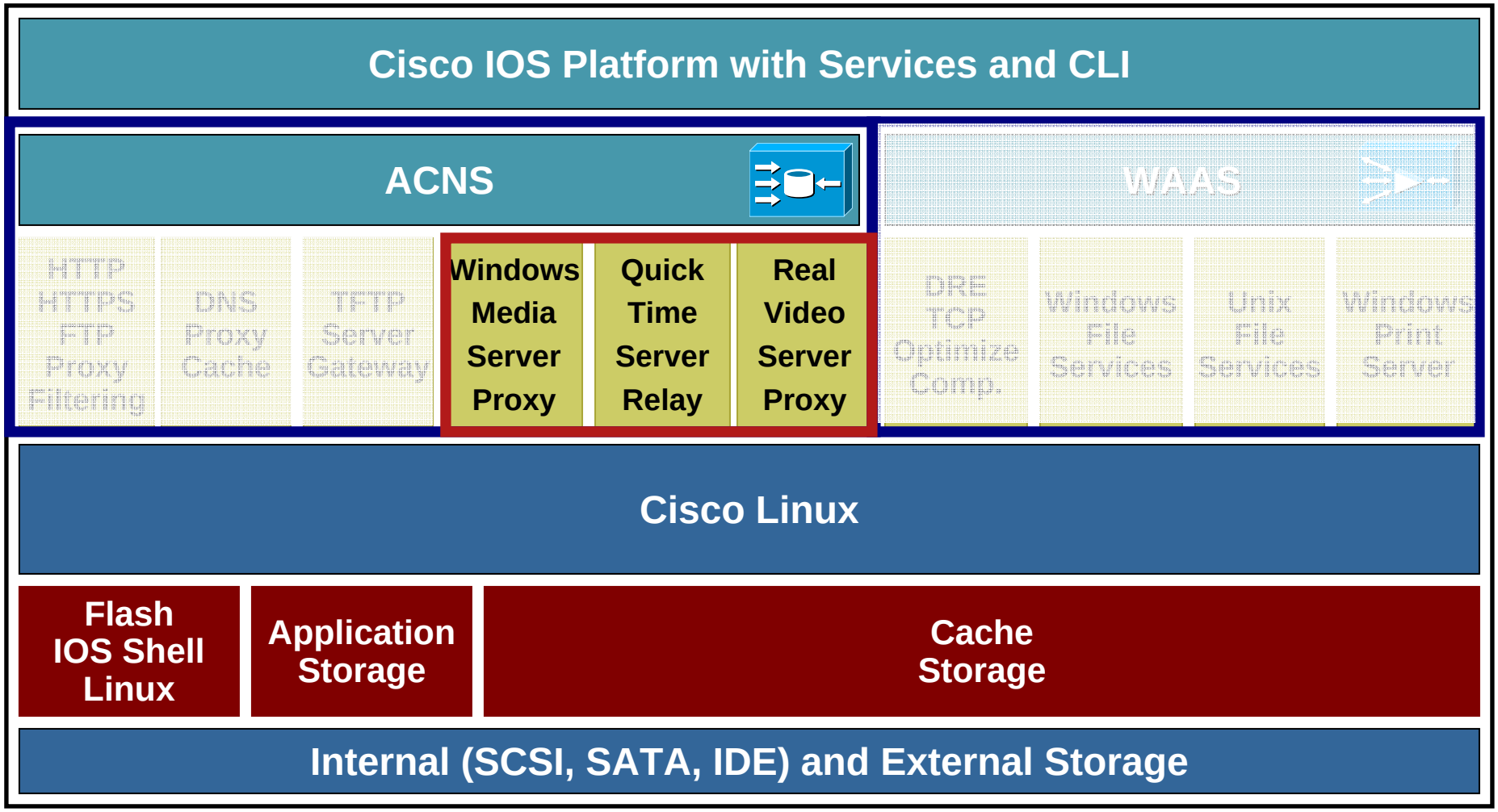
Live Video on Multicast Network

- Multicast enabled LAN and WAN
- Requires event planning and administration



Wide Area Application Engine (WAE)

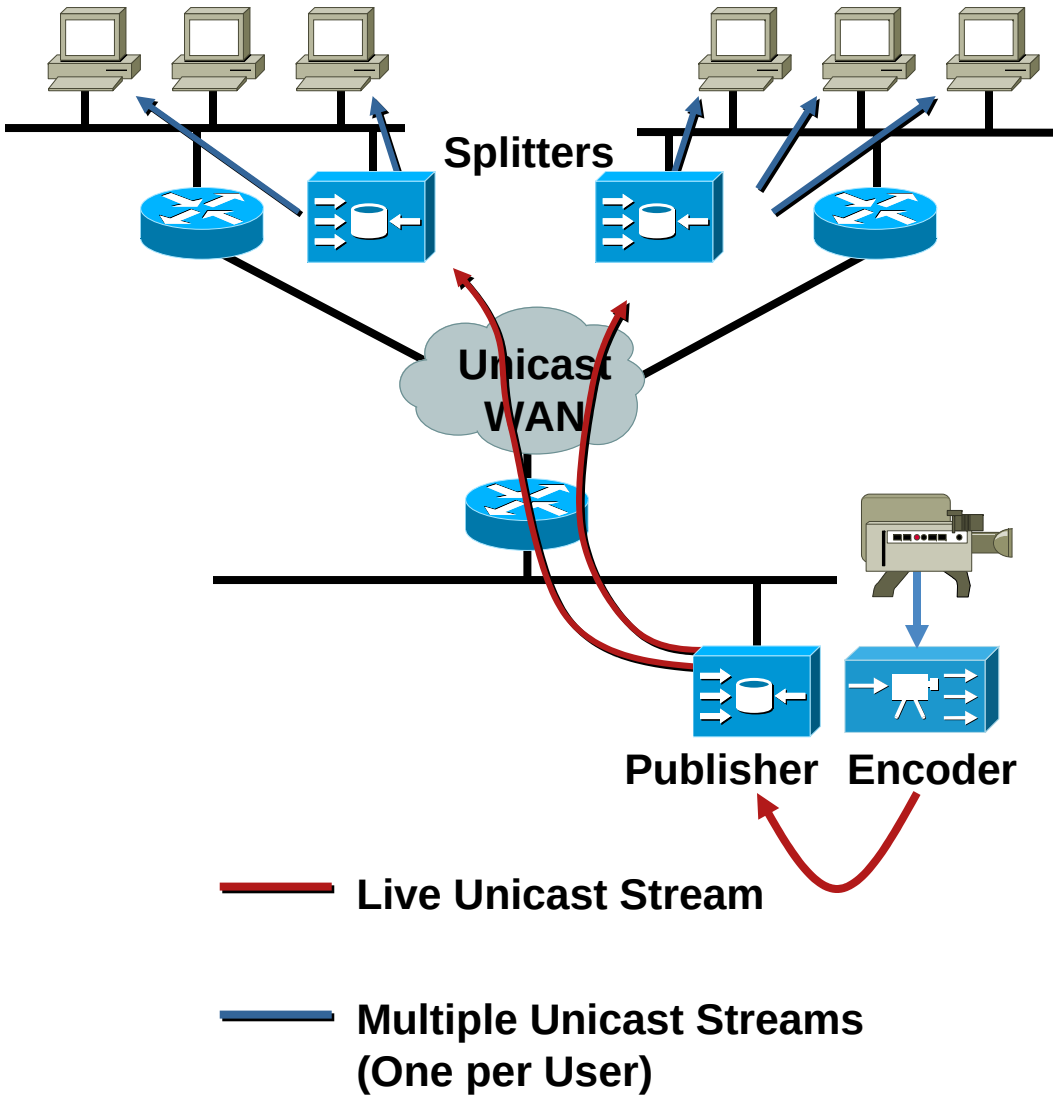
Application and Content Networking Software (ACNS)



Video Architecture

Live Unicast Stream Splitting

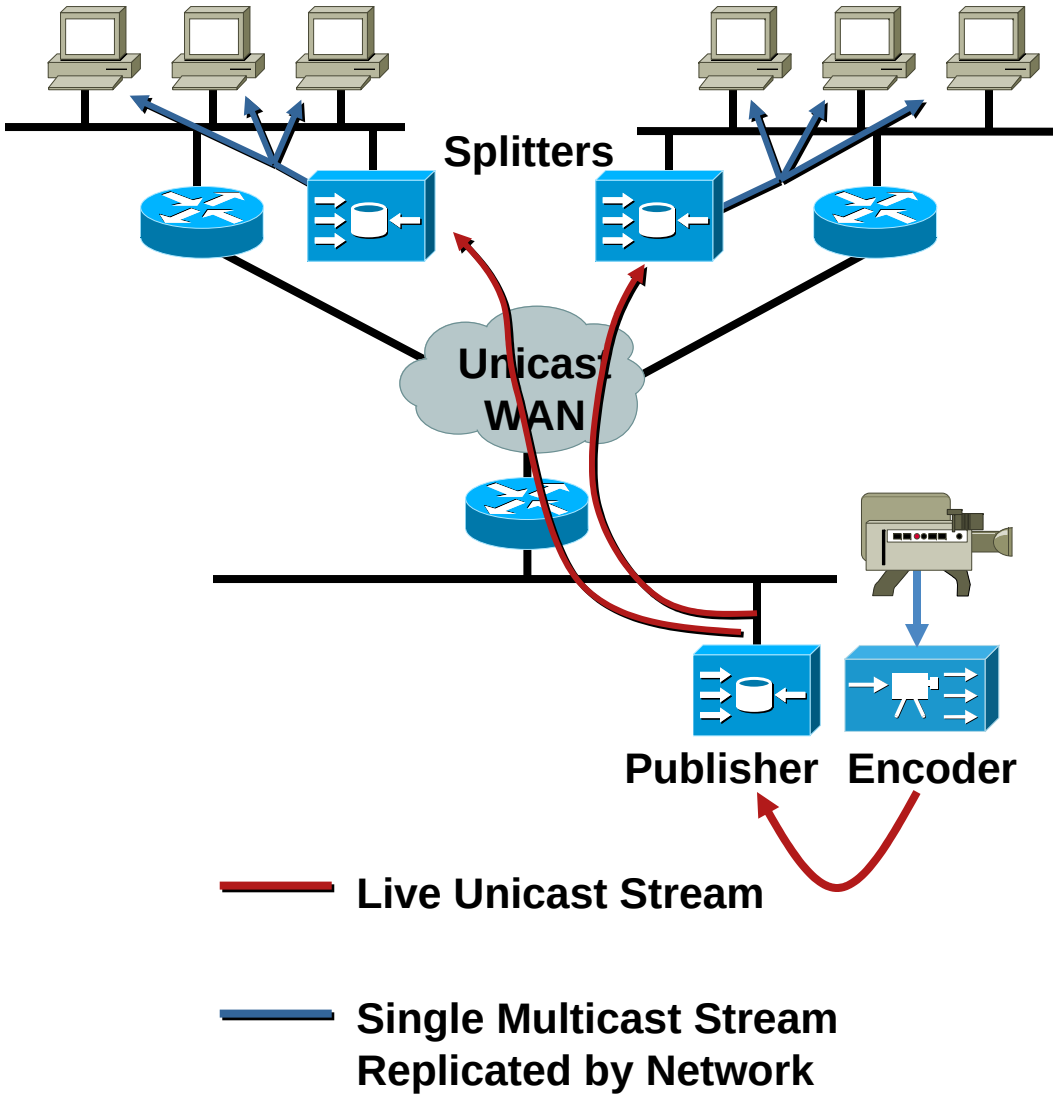
- Overcomes WAN bandwidth bottleneck
- Only solution for adhoc Internet streaming
- Easy to administer since no event planning
- Requires WAE capacity planning



Video Architecture

Live Hybrid Unicast to Multicast

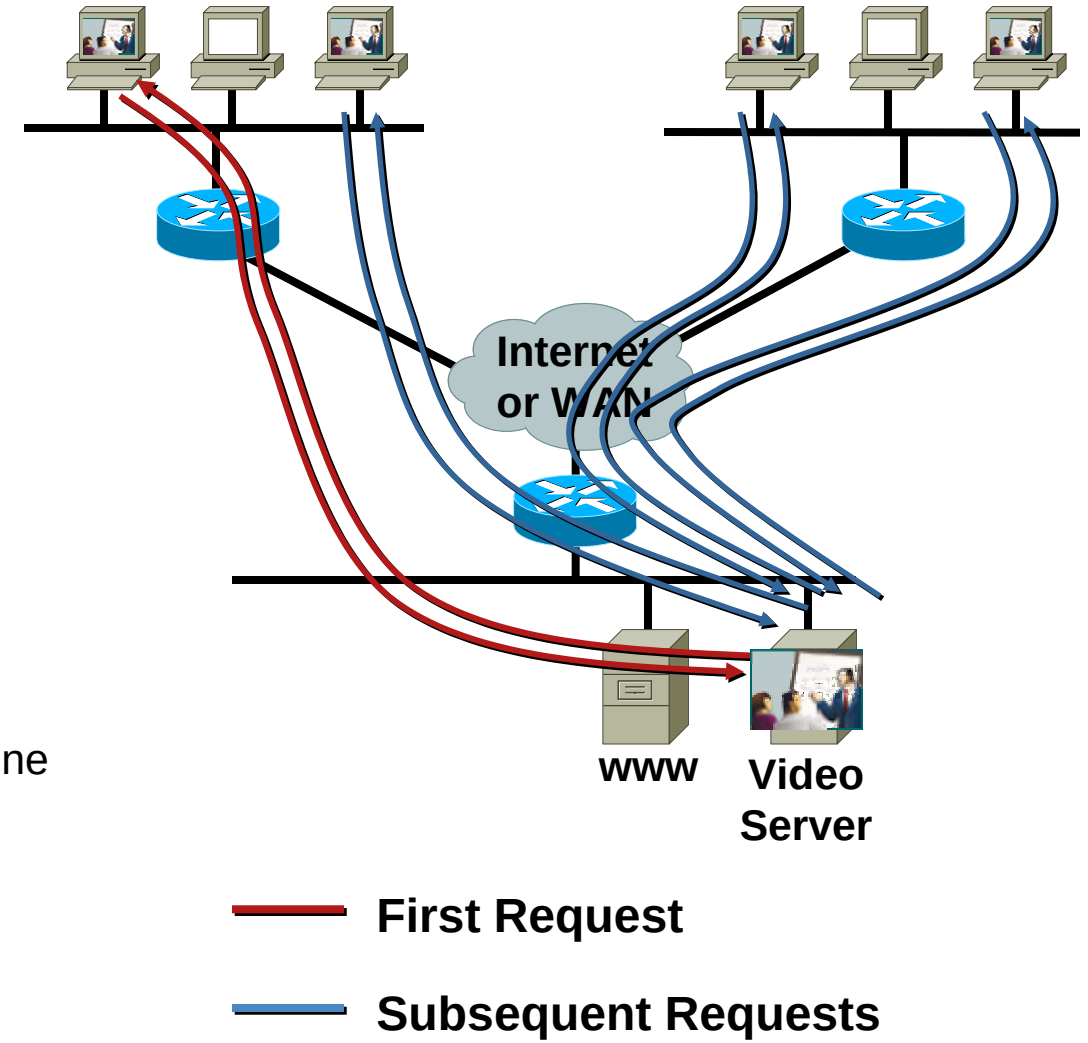
- Multicast enabled LAN only
- Multicast islands require separate Rendezvous Point (RP)
  - Auto-RP
  - Bootstrap router
  - Anycast RP
- WAE scales to many simultaneous programs
- Requires event planning and administration



Video Architecture

Video on Demand on a Non-Optimized Network

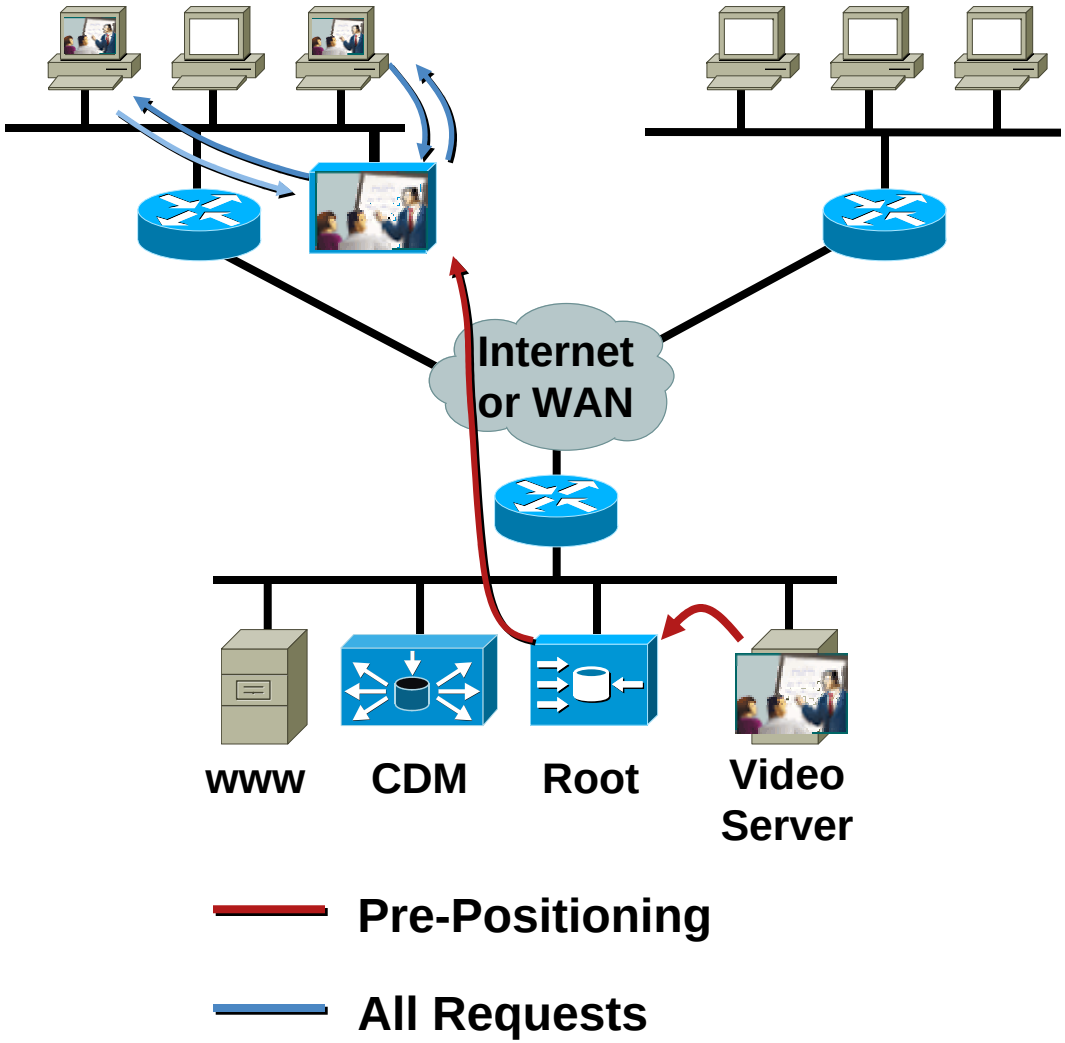
- Separate stream for each client across the WAN
- Sum of all clients must be less than WAN bandwidth
- Expect < 5% of clients normally
- VoD is like live
  - Announced VoD
  - Compliance training deadline



Video Architecture

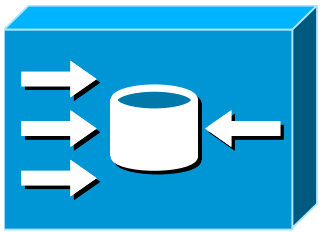
Video on Demand Pre-Positioned

- Streamed bandwidth may be greater WAN bandwidth
- Extreme quality capable
- Edge WAE mirrors contents of video server
- Video files securely and controllably distributed



Video Serving Flexibility Must Be Considered

1. Intelligent Redirection
2. Splitter
3. Server
4. Bandwidth Control



Windows Media Technologies

real

QuickTime™

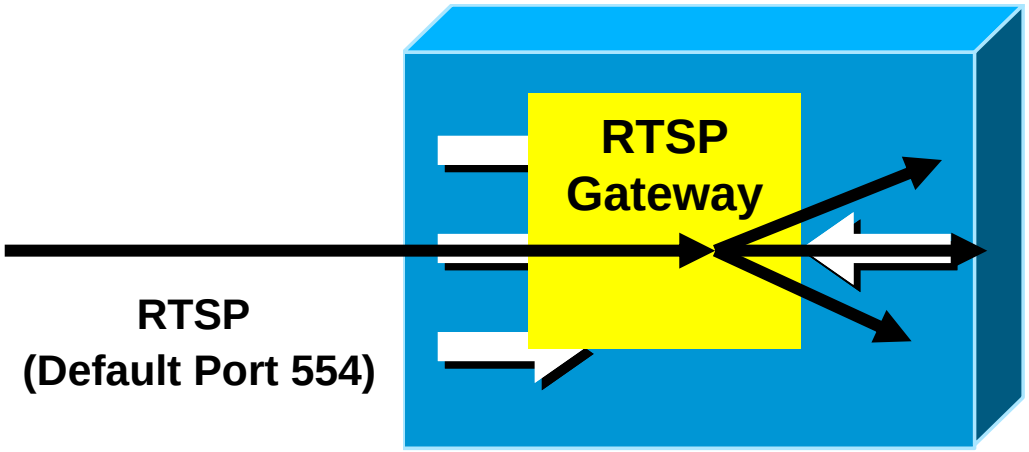
INTERNET STREAMING MEDIA ALLIANCE

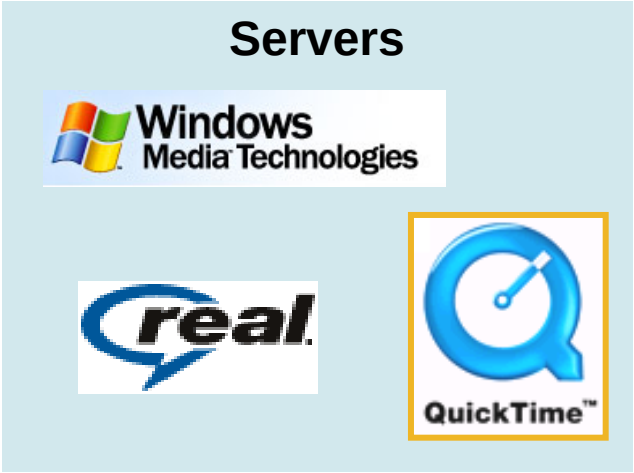
MPEG4 P.10 (Advanced Simple AV, Advanced 2D level1) , MPEG2, MPEG1 over RTP/RTSP

HTTP

Flash and Progressive Download

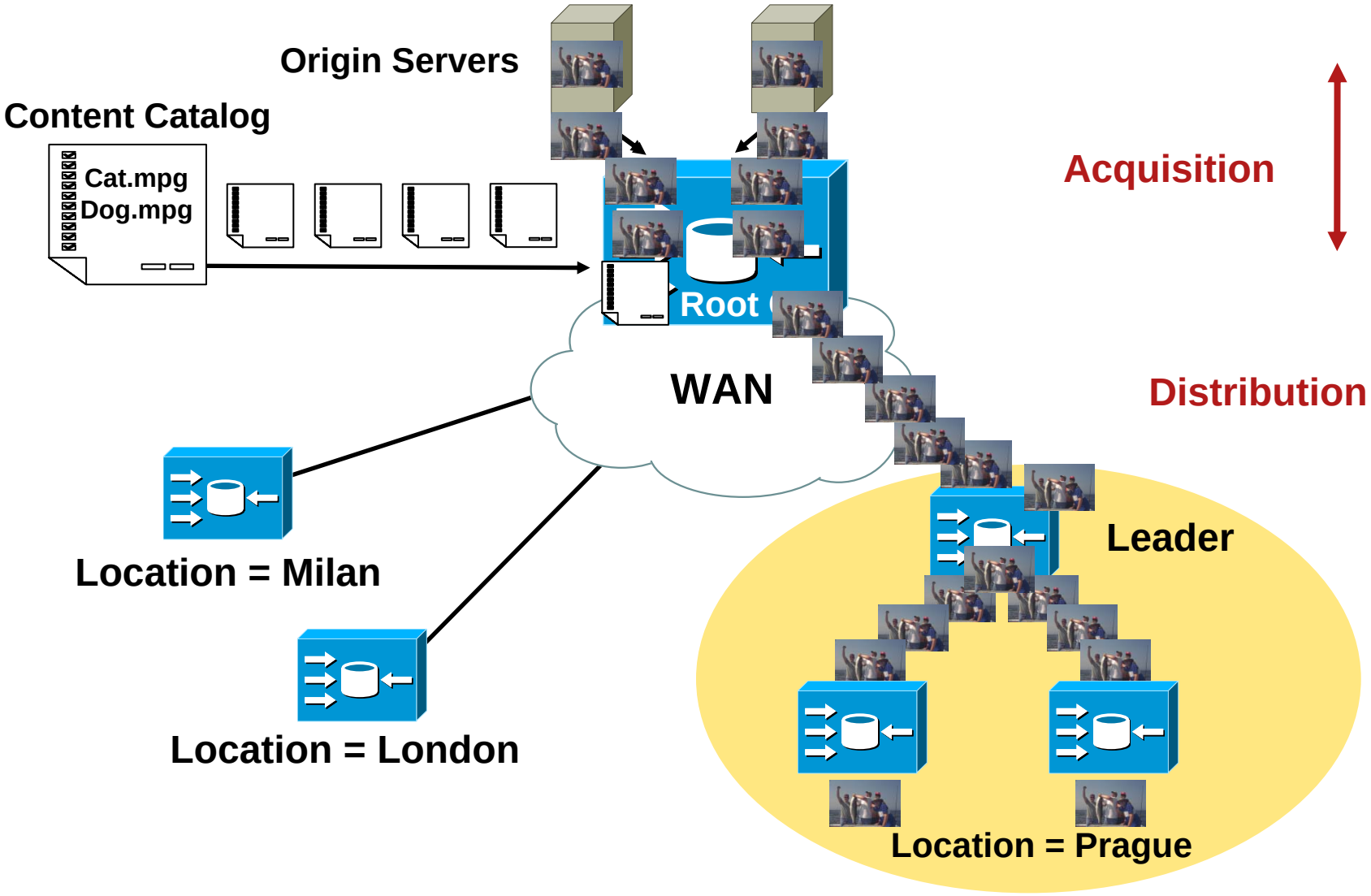
Session Protocol Flexibility Must Be Considered





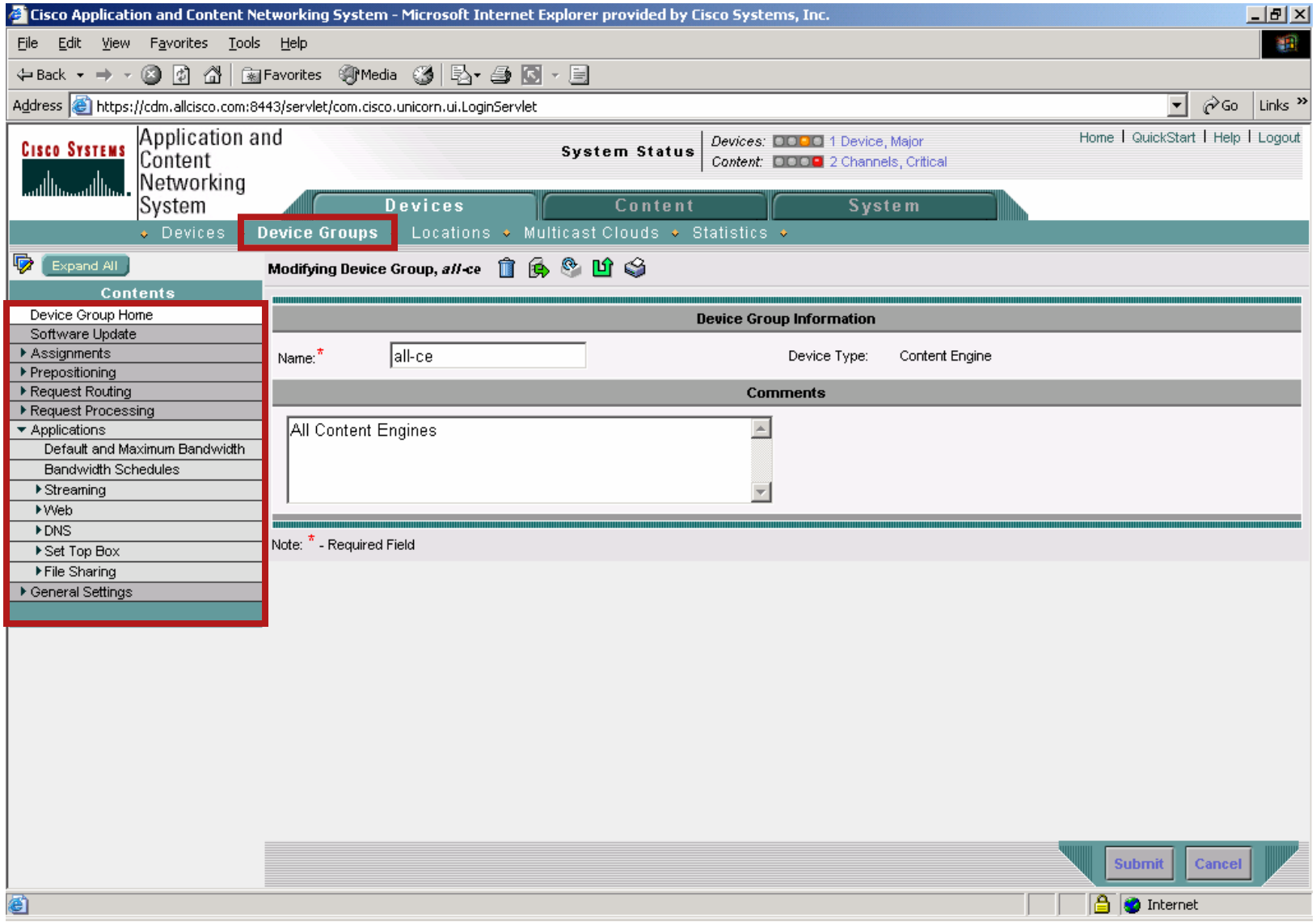
- Check browser type
- Check manifest file
- Check server availability
- Forward to server

Scalable Content Distribution Solution Must Be Considered



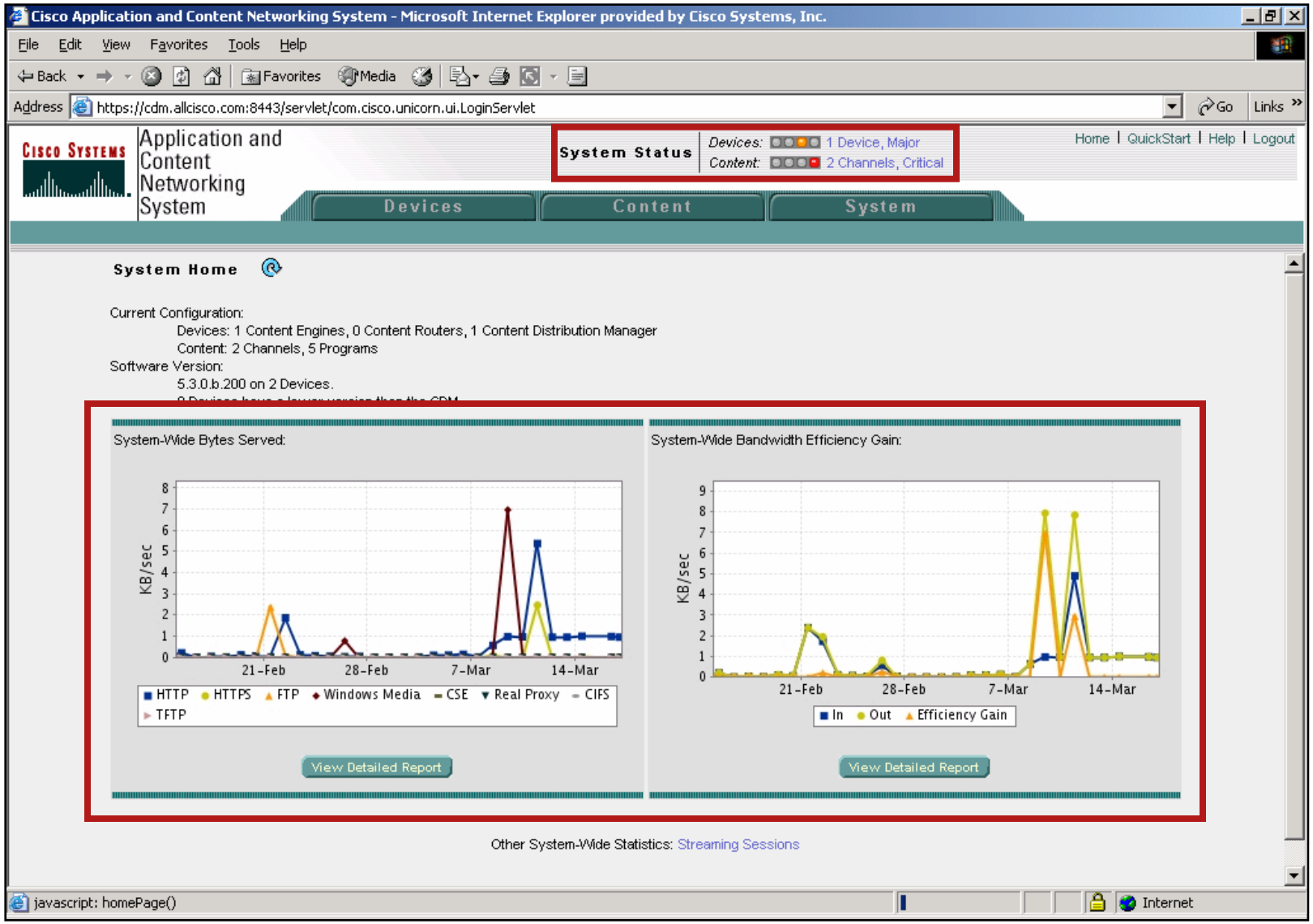
Everything Needs to Be Centrally Managed…

(Example: Group Management and Configuration)



…Monitored and Operated

(Example: Global Protocol Statistics and Faults)




TIME IS THERE….
LET'S START BUILD OUR
VIDEO READY NETWORKS