



Video Streaming Update



Chad Burnham & Matt Nau
Paul Ross

**University Technology Services &
Center for Teaching & Learning**

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Overview of Topics

- Concept
- Video Standards
- Reason's Driving Video Streaming
- In-House or Outsource?
- Solutions DU Considered
- DU's Hybrid Design / Plan
- Architecture – Physical and Application
 - Future proof!?! – Ever Evolving
- New classroom opportunities

Streaming vs. Store Forward Concept

- Common misunderstanding is that many think “Streaming” means “motion video”
- “Store-Forward” is a concept to grasp, and many applications and or delivery methods use this approach!!

Key Standards for DU:

- MPEG 4 is a ISO/IEC Standard
 - MPEG-4 part 2 (a.k.a. simple profile)
 - MPEG-4 part 10 (a.k.a. H.264 / advanced profile)
- ISMA - <http://www.isma.tv/>
- **ISMA Profile 0 (Narrowband/wireless)**
 - MPEG-4 Video Simple Profile
 - 176 x 144 at 15 fps and 64 kbps
- **ISMA Profile 1 (Broadband)**
 - Simple or Advanced Simple Profile
 - 352 x 288 at 30 fps and 1.5 Mbps
- **ISMA Profile 2 (Broadband – better CODECs)**
 - **Audio format:** MPEG-4 AAC and HE-AAC (“High-Efficiency AAC”), including 5.1 surround support;
 - **Video format:** MPEG-4 AVC, also known as ITU-T H.264;
 - **Media storage:** MPEG-4 and AVC File Format (MP4FF, AVC FF);
 - **Media transport:** RTP, RTCP;
 - **Media control and announcement:** RTSP, SDP.
- **3GPP (Third Generation Partnership Project)**
 - Similar to ISMA Profile 0
 - Designed for wireless handheld devices (phones)

Initial Priority for Central Video Streaming Funding/Project

1. Chancellor driven initiative to get DU Athletic live and stored events “on the web”
2. Faculty wanting to deliver clips and full length material to students (inside and outside of classrooms)
3. Penrose Library wanting to migrate old media to a digital delivery system

Comparing ISMA 2.0 profiles and levels with other standard bodies.

	Audio	Video	Bit Rate
			(Total, Measured Audio Video Per Second)
3GPP	HE-AAC + PS	AVC main \cap baseline @ L1b	< 1 Mbit
ISMA profile 2	HE-AAC @ L2, stereo	AVC main \cap baseline @ L2	1.2 Mbits
DVB capability C	HE-AAC @ L2, stereo	AVC main \cap baseline @ L2	2 Mbits
ISMA profile 3	AAC @ L4, 5.1	AVC main @ L3	3.7 Mbits
DVB capability D	HE-AAC @ L2, stereo	AVC main @ L3	10 Mbits
ISMA profile 4	AAC @ L4, 5.1	AVC high @ L4	15 Mbits
DVB Capability E	HE-AAC @ L2, stereo	AVC high @ L4	20 Mbits
HD-DVD	(Other Audio is used)	AVC high @ L4.1	30-40 Mbits
DVD audio ROM	HE-AAC @ L5	N/A	Up to 753 kbits

Legal Issues: Fair Use in Higher Education

- Digital Rights Management
 - Authentication, Authorization, Concurrent Access Rights
 - DMCA
- Patents Acacia Inc.
- Teach Act: 2002 – Pres. Bush
 - Redefines the terms and conditions on which accredited, nonprofit educational institutions throughout the U.S. may use copyright protected materials in distance education—including on websites and by other digital means--without permission from the copyright owner and without payment of royalties.

Campus Video Streaming: In-House or Outsource (or both)?

- Must Have the In-house Expertise for Customization to specific programs
 - Faculty, Technical Faculty Liaisons, Programmers, System Admins, Network Engineers, Programming Engineers, A/V Technicians, Legal, Project Managers
- Bandwidth to Classrooms and/or Internet
- Properly Funded / Hardware / Software

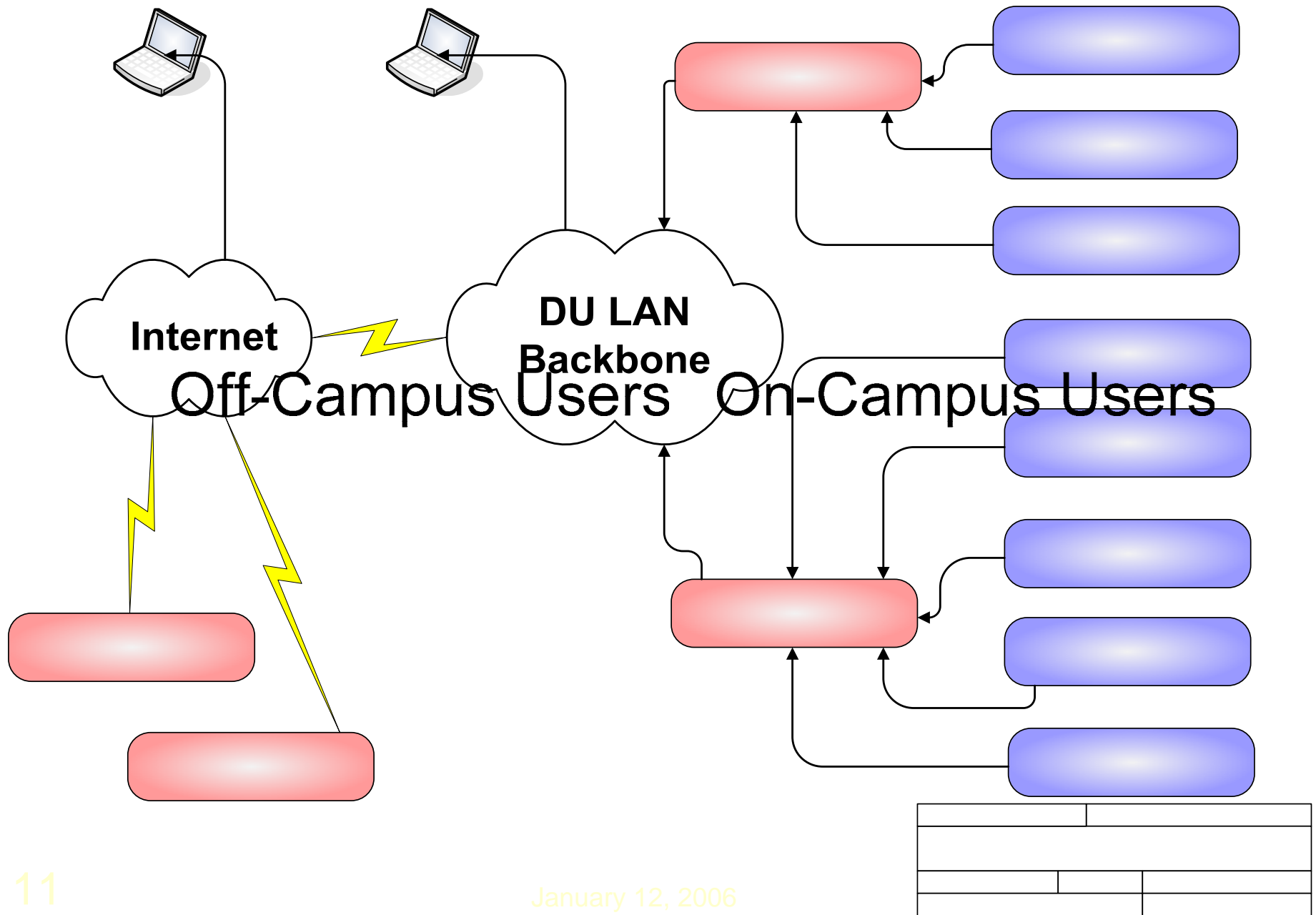
Campus Video Streaming Outsourcing:

- Can be very expensive – usually per flow
- Can alleviate campus bandwidth requirements
- Athletic Conference Agreements
 - Project Overlap?
- Only Certain high profile events
- Integration with Courseware packages

DU Considered Many Canned “Solution” Vendors:

- V-Brick’s EtherneTV
- Kasenna’s Mediabase
- Apple - XServe Platform – QuickTime Server
- Real Networks - Helix
- Windows Media Solution
- Enviro
- Macromedia’s Flash Communications Server
- Cisco’s CampusTV (Vaporware? Big Hype @ Educause)
 - Dartmouth Using/Article.... Hype
- IPlay

DU - Video Server Overall Application Concept



DU's Video Streaming Plan

- Phase 1 = FY 2006 – NOW!
- Hybrid product solution –
 - Not fully redundant
- \$70K Budget
- Pilot project to include 3 different components:
 - MPEG4 / Kasenna Optibase / Black Box / Redhat
 - FLV / Flash Media Server / Dell 2850 / W2K3
 - MPEG4,AAC,MOV / Quicktime Streaming / Apple XServe / OSX10.4

DU's Video Streaming Plan / update – Cont

- Want to “prove” the technology
- MPEG 4 (Part 2&10–H.264) was the goal
 - Flashvideo 1MB/sec (FLV Codec, ONVP6 Soon)
 - MPEG4 Part 2 (480x360)
 - MPEG4 Part 10 (having problems)
 - Apple X-Serve not yet implemented
 - Presently using Darwin on Windows Box for test
- Continued Bandwidth target:
 - 300k for off campus (distance) and 1M for on campus

Kassena

- 1 x Video Storage/Streaming Server
- Starting with their lower end server as trial
- “Optibase” Appliance Server
- “Mediabase 8” Software
- Linking with External Encoder
 - Live Events is Target Application
 - VBrick and or Optibase?
 - Not yet implemented / Planning

Macromedia's Flash Communications Server

- Software – on Dell Hardware
- Stacking 3x Professional Lic.(30Mbps)
- Allows for “Interactive” response to media content – custom interfaces/controls
- Requires Expert (trained) Programming
 - C.T.L bringing programmers to table @ DU
- New Version (2.0) coming in October
 - Comparable to H.264 / MPEG4 / WMV

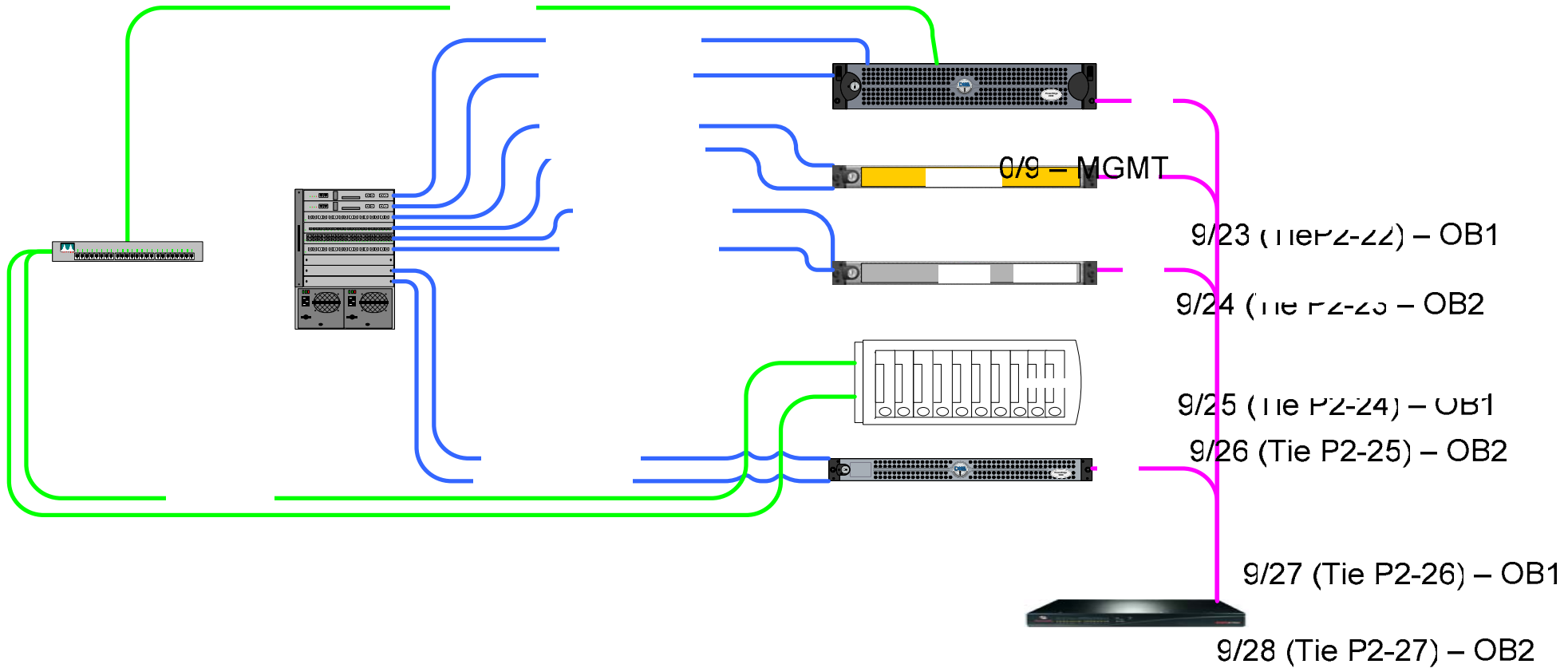
Apple – XServe Platform

- Apple G5 XServer
 - Attached SAN (3.5 Terabytes)
 - Fiber Channel 2 Attached
 - MPEG 4 – Parts 2 & 10
 - 3GPP (1 and 2) streaming for future
 - Users @ DU will be required to download and use QuickTime Player
 - PC and MAC supported
 - CTL Piloted Darwin (free) Server on Windows Platform with success (Solaris Compatible)

Asset Catalog Database Server

- Dell Hardware / Windows Server 2003
- MY-SQL and/or Open LDAP Directory for media content data
- Catalog media content data function
 - Allows for existing campus video projects to be integrated into this project

UTS – Video Streaming Service - 2006 – Phase 1

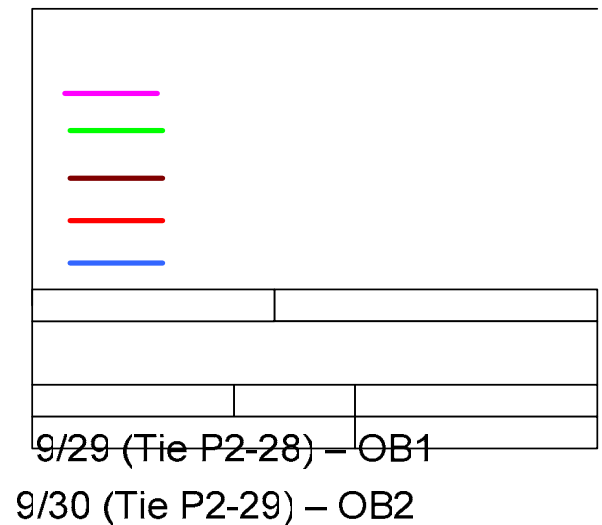


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Sturm COLO
Data Center
PS-UTSTM-1
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0/10 - MGMT 1

Video Content Backups

- Complete “Disk Copy” vs. Central Tape Solution.
 - DU just upgraded to Scalar LT03 Drives
- SAN on Apple offers a portion of this...
- Not nailed down yet.....
- Policy ?
- Both Methods ?



DENVER
PIONEERS

DU Athletics

- WCHA Video Exchange
 - Basketball & Hockey Coaches Only
 - Hosted by XOS
 - Used to postal mail video tapes to one another
 - Download and watch high quality games for review – 720x480 – MPEG 4
 - ~1.5 GByte per Hockey game

DU Athletics – Public Video

- Trial partnership with FOX sports → Hosted my MSN.com
 - Linked from DU Website:
 - <http://denverpioneers.collegesports.com/> -> <http://msn.foxsports.com/id/5133174>
 - Data flow is an Akamai cache stream from France !?!
 - Users do not register/pay for streams
 - MSN/FOX advertisement driven
 - Small % (TBD) back to DU
 - 30 second intro spot must watch
- DU Athletics website is run by FOX content competitor, Collegesports.com
 - Just purchased by CBS
 - They also have a streaming offering for \$6.95/mo or \$50/year
- Streaming wars !?!

DU Athletics – Public Video Con't:

- FOX/MSN
 - Some games are full-length – produced by DU
 - DU specific ads - 5 minute or as a “commercial”
 - FOX retains rights
- Some games are highlights only
 - FOX produced
 - Issues: Cutting off announcer, etc.
 - DU training FOX people how to do it
- 430x240 resolution – not bad on full screen
- No statistics yet from MSN/FOX – waiting...

Links

- <http://www.kasenna.com>
- <http://www.apple.com/education/streamingsolution/>
- <http://www.macromedia.com/software/flashmediaserver/productinfo/features/>
- <http://www.isma.tv/>
- <http://www.mpeg4.net/>
- <http://www.imtc.org/>
- <http://www.mpegif.org/>
- http://www.realnetworks.com/products/media_delivery.html
- <http://www.envivio.com/>
- <http://www.isplay3.com/markets/university.html>
- [Teach Act](#)