

ANU Digital TV

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Last Episode



TV Convergence Project
A work in progress

Roy Meuronen
QUESTnet 2005

Questnet 2005
Coolum



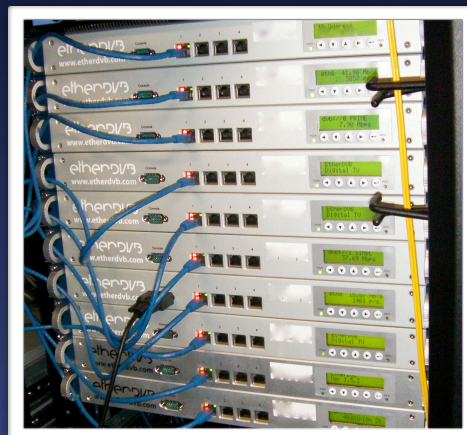
Where we were (2005)

- Trial of technology
 - One commercial off the shelf streamer
 - 1 Set-Top-Box

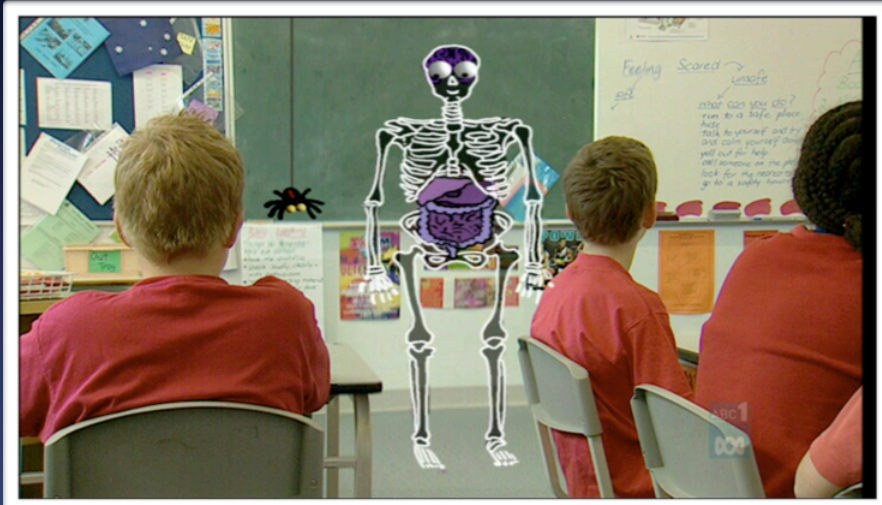


Where we are now

- Production service
- 10 head-end streamers
- 20 set-top-boxes
- 80+ video channels
- 40+ radio channels



Channels



Where we are going

- Campus wide desktop delivery
- Integrated service in new accommodations
- Recording
- Local content

Why we are doing this

- Upgrade of legacy analogue equipment
- Learning resource
 - Foreign language content
 - International news sources
- On-campus accommodation
 - International students

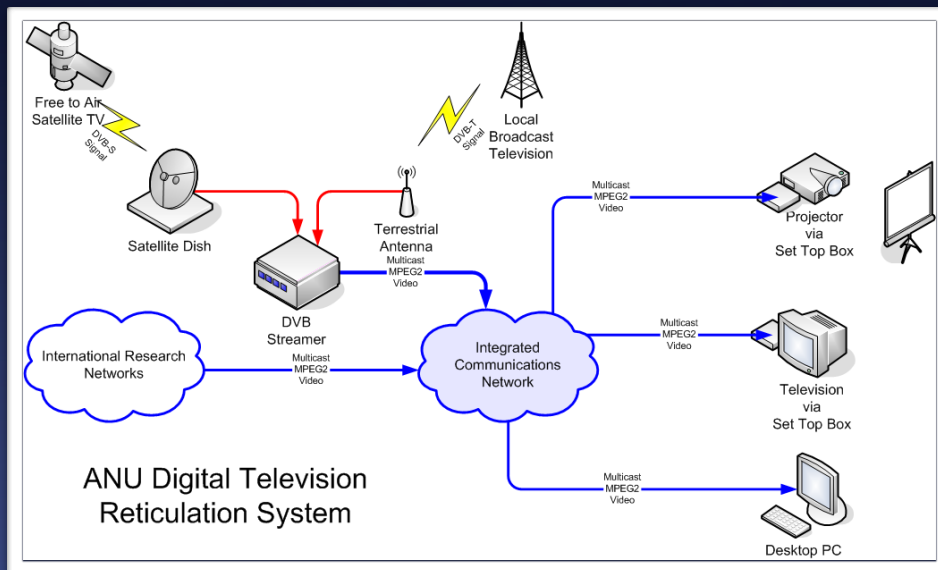


Design Philosophy

- Digital end to end
- Multicast
- Flow-through information



Topology



Receivers

- I Terrestrial Antenna



Receivers

- 5 C-Band Satellite Dishes (3.0m)
- 1 K-Band Satellite Dish (1.2m)
- Dual polarity feeds



Satellites

- AsiaSat 2
- AsiaSat 3
- Intelsat 2
- Intelsat 8
- Optus D2
- Palapa C2
- Chinasat 6



Head-end

- 10 EtherDVB Streamers
- 5 DVB-T Tuners
- 15 DVB-S Tuners



Management Interface

- Web interface
- SAP Announcements
- XML publishing



Tuning

dvb://1 - DVB Satellite

Network Name: MediaCorp Technologies		Bitrate: 8.304 Mb/s
BER: 0	Strength: 0 %	SNR: 0 db

[Basic Settings](#)
[Bouquet Presets](#)

Frequency: MHz **Inversion:** **FEC:**
LNB Frequency: MHz
Symbol Rate: KHz **Tone:** **Polarization:**

Program	Name	State	Bitrate	Streams
dvb://1/1	CNAI PAL	Streaming	3.992 Mb/s	x 1
dvb://1/2	CNAI NTSC	Idle	3.962 Mb/s	

Streaming

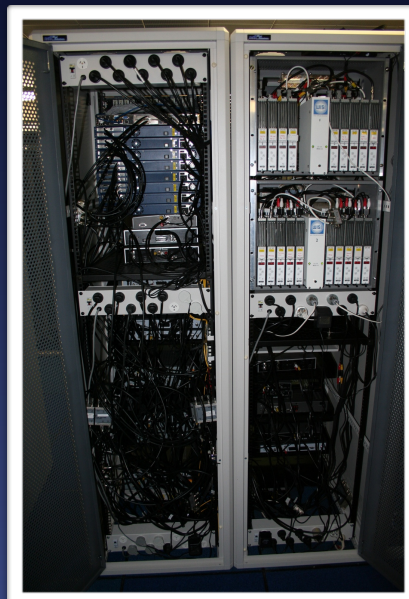
Program Listing

Program	Name	State	Bitrate
dvb://0/1	DEFAULT	Streaming	5.526 Mb/s
239.224.0.53 1234 4 0x18 ANUTV International/VoA eth0 Cancel 1234 4 24 DEFAULT eth0 Create			
dvb://0/2	ch 2	Idle	0.814 Mb/s
1234 4 24 ch 2 eth0 Create			
dvb://0/3	ch 3	Idle	0.692 Mb/s
1234 4 24 ch 3 eth0 Create			

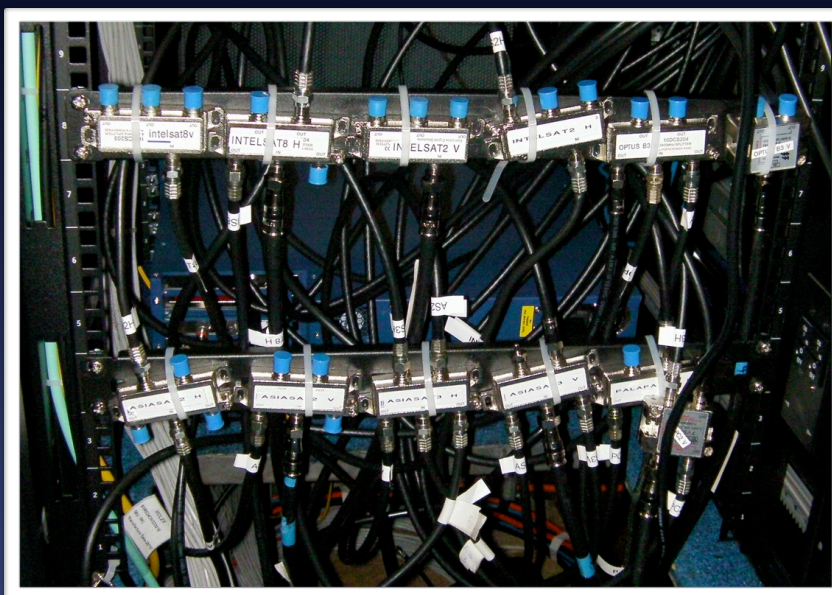
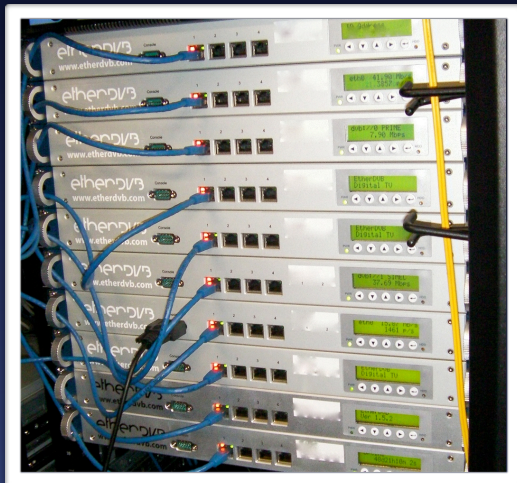
Ad Hoc SAP

SAP Server				
Description	Group	Port	TTL	Action
ANUTV Network/Research Channel	233.0.73.29	1234	4	Delete
ANUTV Network/UWTV	233.0.73.28	1234	4	Delete
ANUTV Network/Medical Broadcast Channel	233.130.187.0	4443	4	Delete
				Create

Before

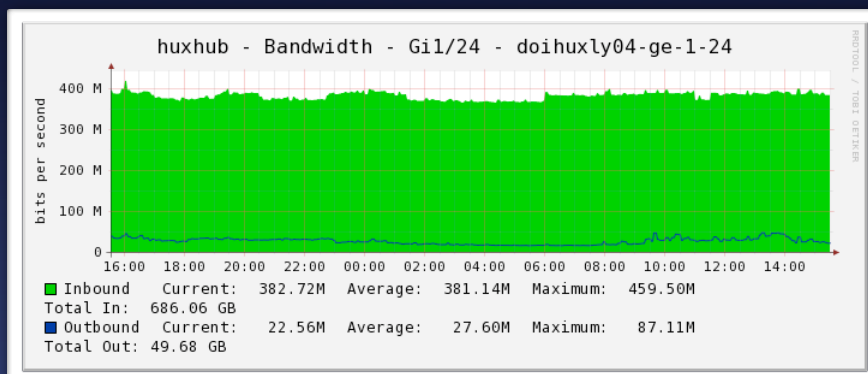
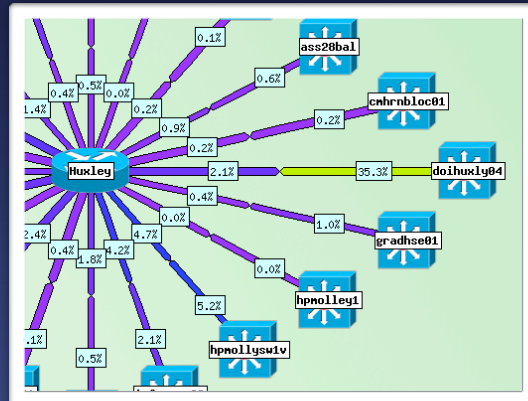


After



Distribution

- Multicast
- >380Mbps Total
- On-campus only
- ACL / TTL



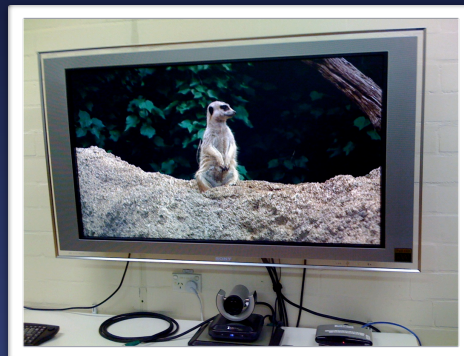
TV Viewing

- Amino STB
 - Aminet 110 (MPEG2)
 - Aminet 124 (MPEG4)
 - Aminet 130 (HD)

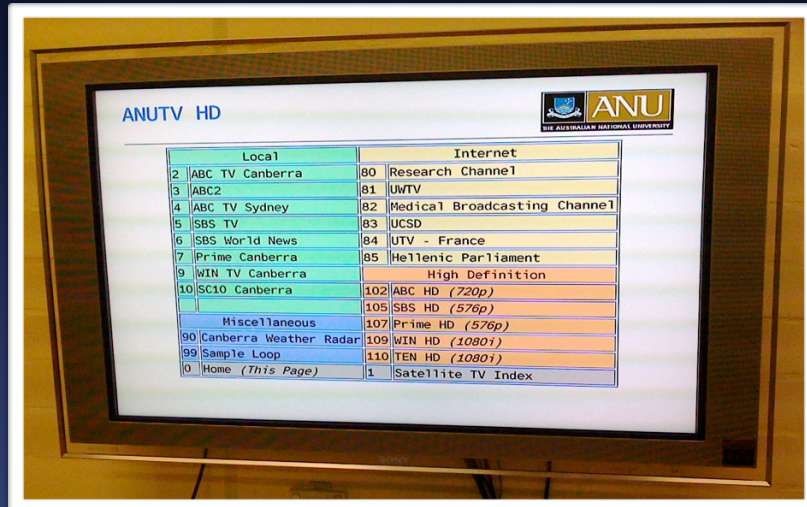


STB Display

- HTML / Browser display
- Home Page sets channels
- Remote management



STB Channel Index



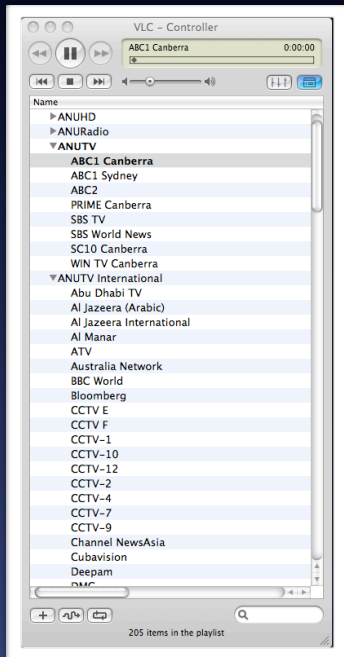
ANUTV HD	
Local	Internet
2 ABC TV Canberra	80 Research Channel
3 ABC2	81 UWTW
4 ABC TV Sydney	82 Medical Broadcasting Channel
5 SBS TV	83 UCSD
6 SBS World News	84 UTV - France
7 Prime Canberra	85 Hellenic Parliament
9 WIN TV Canberra	High Definition
10 SC10 Canberra	102 ABC HD (720p)
	105 SBS HD (576p)
Miscellaneous	107 Prime HD (576p)
90 Canberra Weather Radar	109 WIN HD (1080i)
99 Sample Loop	110 TEN HD (1080i)
0 Home (This Page)	1 Satellite TV Index

Desktop Viewing

- VLC
- <http://www.videolan.org>
- Mac, Linux, Windows
- Browser Plug-in

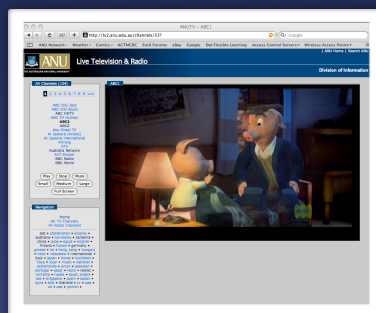


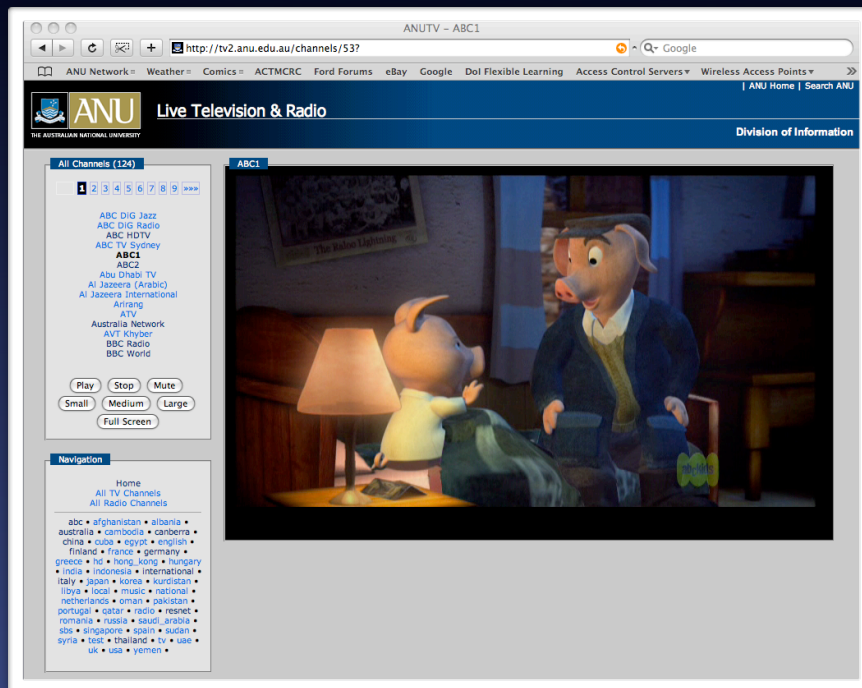
Desktop Viewing



Web Interface

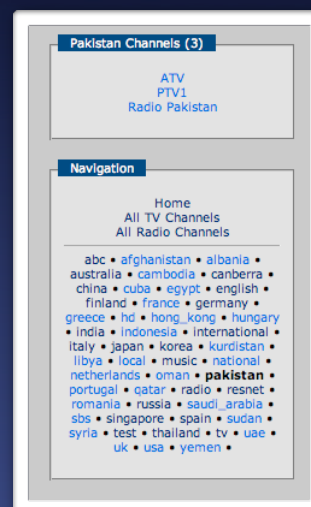
- Clean controllable interface for channel selection
- Uses VLC plug-in
- Cross platform
- Safari, Firefox, IE



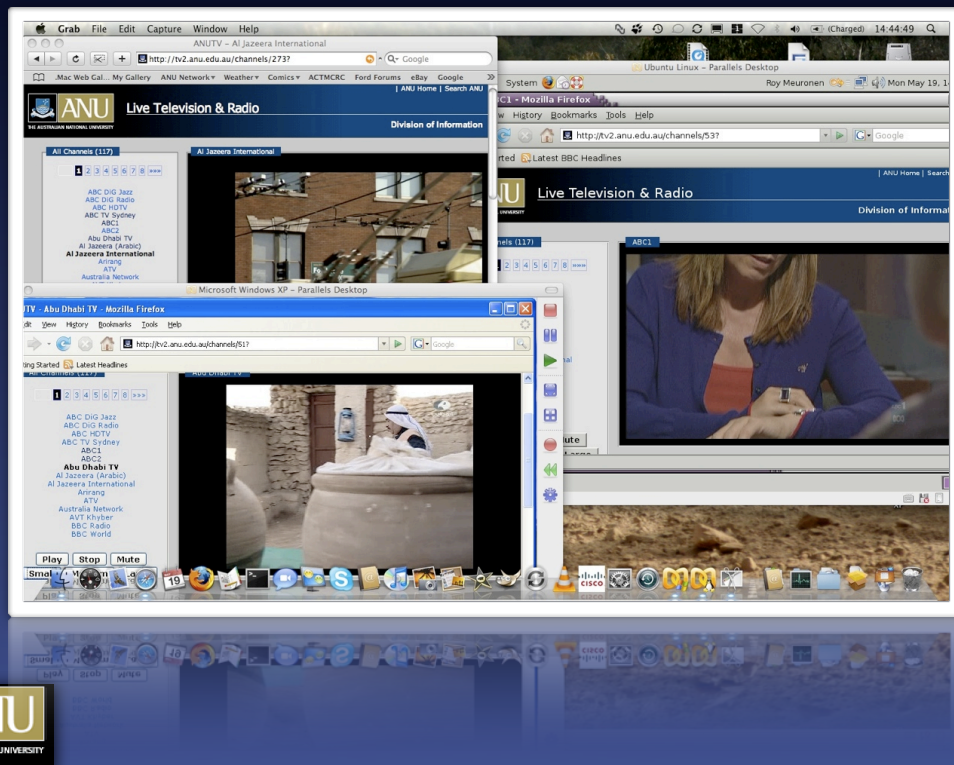


Web Interface

- Tagging of channels for easy search
- Unique URL for each channel
- Easy links from LMS
- Dynamic channels sourced from streamers (XML)



Multiple OS



Challenges



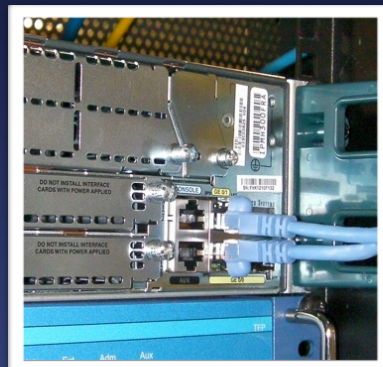
Multicast v Firewall

- Distributed virtual firewall topology inside the campus.
- Firewall blade in virtual mode does not do multicast
- Not on roadmap



Multicast v Firewall

- Router on a stick at each core node
- Routes multicast around firewalls
- Specially crafted ACLs
- Multicast to Desktop!



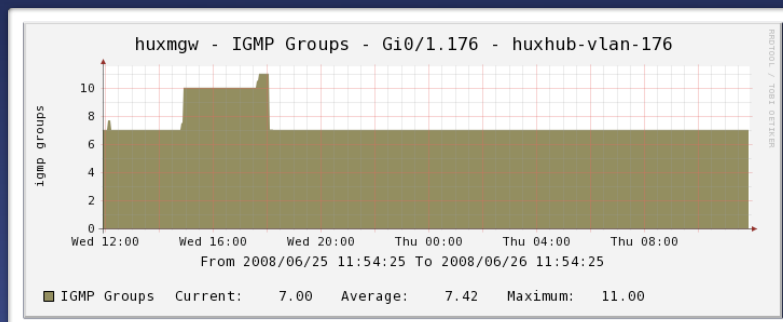
Bandwidth

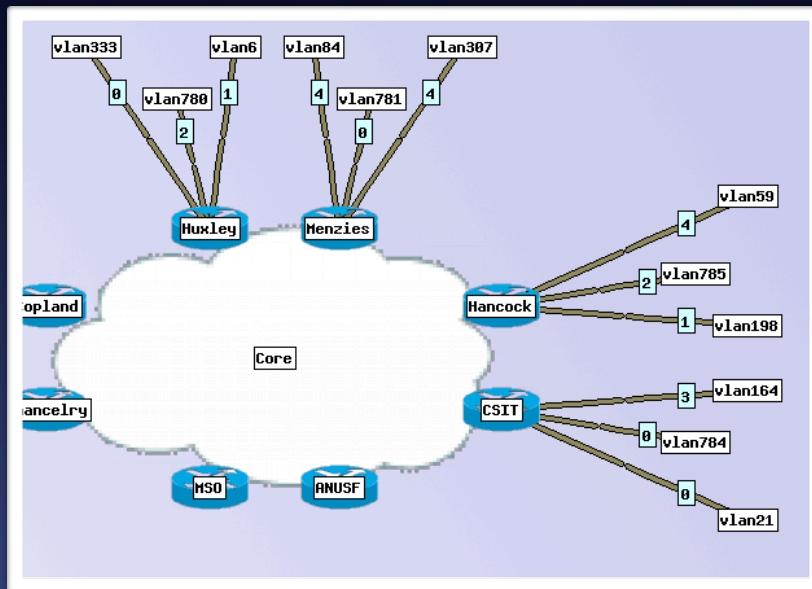
- 10Gbs Backbone
- 1Gbs Distribution (mostly)
- Still some buildings on 100Mbps interconnects
- Still some buildings on Cat 3/4 cabling
- Offer a sub-set of channels to desktop



Monitoring

- Is anybody watching?
- How many are watching?
- What are they watching?



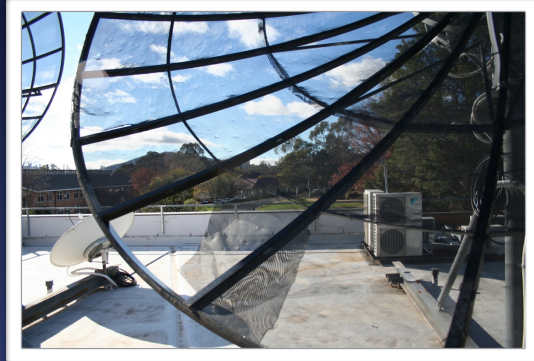
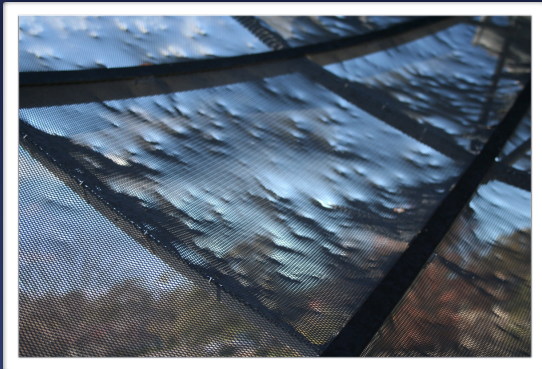


Mother Nature



Mother Nature

- February 2007
- Severe Hailstorm





Where Next?



Unilodge 2

- 500 Room Student Accommodation
- Entire TV infrastructure reliant on ANUTV
- Combination of Desktop and STB



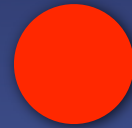
Recording

- ANUTV Record
- Under development
- VVR Application
- Apple Podcast Producer back-end



Recording

- Regular recordings of news services
 - e.g. ABC News
- Scheduled recordings via web interface
- Content available via browser or RSS/ iTunes
- Multi-purpose encoding



FAQ

- How does this effect my quota?
- What are the traffic charges?
- Why can't I have it when so-and-so can?



One More Thing...



Media Services

- iTunesU
- Immersive Lecture Experience
- Media delivery challenges
- Opencast Project



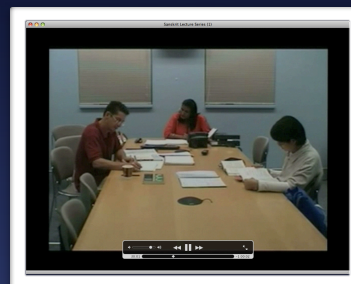
iTunesU

- Audio & Video content available via iTunes store
- Public Lecture Series
- Courses
- Campus Life



Immersive Lecture Experience

- Technical evaluation of alternative digital lecture delivery method
- Multiple Video Inputs
- Podcast Producer Backend



Media Challenges

- Storage
 - Lots
- Processing
 - Encoding (xGrid)
- Network capacity
 - Hourly surges



Opencast Project

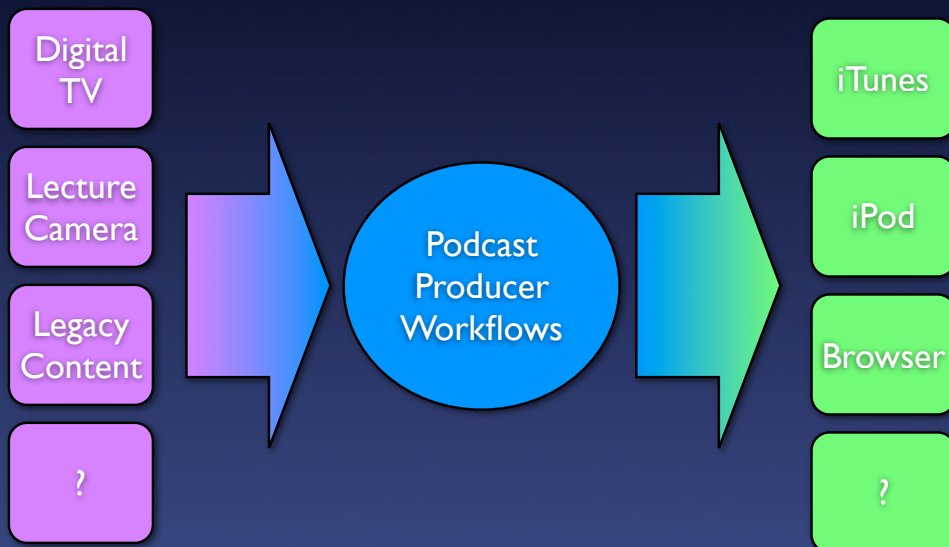
- www.opencastproject.org
- Podcast Producer
- Sharing
 - Technologies
 - Workflows
 - Best Practice



Synergies

- Modular design
- Flexible inputs, workflows and outputs
- Multi-purposing content

Synergies



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