Live streaming
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What we’ve tried

• Camtasia
  – record PPT & audio
    • Chris Wakelin’s security presentation (16/2/09)

• video recording
  – my software licensing presentation (2/2/09)
    • some video editing required to insert slides into video

• live streaming
  – IT Supps conference (31/3/09)
What do we want?

• record of session
  – slides
    • minimum requirement
  – audio
  – video
    • how useful is it to see presenter?
  – record of Q&A
What do we want?

• remote participation
  – live streaming
    • for conference
      – camera pointed at projection screen and lectern
      – microphone for presenter
  – feedback channel
    • for asking questions & reporting problems (“we can’t hear”)
    • MSN, Elluminate, BB virtual classroom, ...
    • load slides into this too?
  – “+1” service?
    • streaming delayed by an hour
Speakers

• comfortable with being recorded?
  – mistakes
    • e.g. my licensing presentation

• permission?
Other things to consider

- lecture capture
  - growing number of rooms with ceiling mounted cameras
    - Chemistry, Carrington, ICMA, Business School
  - needs to be easy to use
    - Chemistry & Carrington aren’t

- digital signage
  - growing number of signage screens
  - Samsung MagicNet not easiest system to use
Technical details

• over to Andy Gatward…
Clarifications

• Lecture capture has different requirements to live broadcast

• Live broadcast should be:
  – Recordable
  – Secure
  – Low delay
  – Good quality
Systems in use currently:

• Live broadcast:
  – Elluminate
  – MediaSite
  – RealNetworks
  – Windows Media
  – IPTV Platform

• Lecture capture:
  – Camtasia
  – MediaSite
  – Replay

• Media distribution:
  – RealNetworks
  – Windows Media
  – YouTube
  – iTunesU (coming)
  – IPTV Platform

• This is a support nightmare!
Standards

• Need to find common standard
  – Live broadcast in IPTV format
    • Viewable using software or hardware clients
    • Can be integrated easily into IPTV pilot
    • Easy to record and transcode for use on other systems
  – Recorded media in format that can be read by all platforms
    • Avoid proprietary codecs
    • But may incur license costs
    • Needs to be easy to transcode back to IPTV format
Standards

- Digital Video Broadcasting (DVB) format
  - MPEG2 Transport Stream
  - MPEG2 or MPEG4 video
    - MPEG2 video most common
    - MPEG4.2 (MPEG4) video used in Europe
    - MPEG4.10 (H.264) video used for HDTV
  - MPEG2, MP3 or MPEG4 audio
    - MPEG2 audio used on broadcast TV
    - MP3 audio used on DAB radio
    - MPEG4 audio (AAC) used for HDTV
  - Plus a number of other things to make it work
DVB format

MPEG2-TS

Program

PS

PS

PSI

PAT

PMT

PCR

Live streaming
Standards

- Recorded format
  - MPEG4 container (.MP4 file)
    - Must include ‘hinting’ or cannot be streamed
  - MPEG4 video
    - MPEG4.10 (H.264) gives best quality
    - But if using this, should only use ‘simple profile’ for maximum compatibility
  - MP3 or MPEG4 audio
    - MP3 lower bit rate
    - MPEG4 (AAC) gives better quality
Live broadcast IPTV style
Broadcast encoder

• Looked at commercial solutions
  – Very nice but very expensive
  – Can be quite complex to configure
  – £1,250 + VAT for PAL 4:3 MPEG2 encoder

• So built our own as a trial
  – Intel Atom dual-core system, 1GB RAM, mini ITX, LCD display
  – Hardware MPEG2 encoder card but also investigating DV input
  – Custom built Linux distribution booting from CompactFlash
  – VideoLAN software used to format and send stream to head end
  – Linux + VideoLAN fits in 142MB of storage
  – Total cost: £350 + VAT
Security

• Need to prevent third parties injecting their own content
  – Head end has UDP ports open to receive content
  – Ports need to be open to entire campus LAN for flexibility

• Use encryption between encoder and head end

• Be careful with multicast scope
  – Should be limited to organisation boundaries unless intended to reach a public audience
  – Use addresses in 239.254.0.0/16 to reach ReadingConnect
  – Use addresses in 239.253.0.0/16 for campus LAN only
  – Really need to use custom group for session announcements
Head end

- VideoLAN and miniSAPserver on Linux system
- VideoLAN
  - Used to decrypt feed from encoder and relay to multicast group
  - Also bridges data to a unicast RTSP feed
  - Can optionally record and transcode
    - E.g. IT Supporters conference
- miniSAPserver
  - Announces sessions to clients
  - Required for Set Top Boxes
  - Useful for software clients
Recording from live broadcasts

• VideoLAN configured to save file as:
  – MPEG4 container
  – MPEG4.10 (H.264) video
  – MPEG4 (AAC) audio

• RealNetworks streaming server can read these files
  – But they must be hinted first
  – So there is a single step between saving and streaming
  – But VideoLAN developers have plans to incorporate hinting

• iTunesU can use these files directly

• Simple step to convert for YouTube (Flash Video)
Client side

• Set top box
  – Don’t have any of these yet
  – But looking to evaluate some in conjunction with external partner, Move Networks (formerly Inuk Networks)
  – LAN in, video out
  – Centrally managed (DHCP, settings, firmware)
  – Dumb devices, boot from multicast
  – Content appears as just another channel
Client side

- VideoLAN
  - Free and full-featured
  - Developed by people in over 20 countries
  - Open source
  - Started at École Centrale Paris
  - Contributions from the likes of BBC R&D and BT
  - Used extensively at other Universities
  - Skinnable so can be made user friendly
Client side

- Integration with Move Networks “Igloo” client
  - Software set top box platform
  - Will be used on readingConnect to provide IPTV service
  - Content appears as just another channel
  - Need to look at how to provide electronic program guide (EPG) data
Demos

- Move Networks IPTV client
- Sneak preview of IPTV platform for campus