



Experiences of Delivering IPTV to Student Accommodation in the UK

Simon Lockhart

Tuesday, October 14, 2008



BACKGROUND ON INUK NETWORKS

- Services:
 - Broadcast quality linear TV and Video on Demand (VoD)
 - VoIP telephony
 - Application aware Broadband
- Target customers:
 - Subscribers - multiple vertical markets; student, residential, military, health etc.
 - Network providers - wholesale to Kingston, Pipex etc.
 - Broadcasters - targeted advertising and carriage to Channel 4, Five etc.
- Partnered with Cable & Wireless as their exclusive IPTV provider
- Contracts with major broadcasters and content owners to deliver their content (BBC, Virgin Media, Setanta etc.)
- Investors include Wesley Clover, S4C, Vantage Point and Cable & Wireless
- Launched free-to-air TV and telephone under Freewire brand in Sept 2006 and will launch premium TV in September 2007
- UK incorporated company employing 50 staff



A LOOK AT THE UK STUDENT MARKET

- Approximately 3.2m students in the UK - 500k live in halls of residence
- Students in halls can not easily receive digital TV today (No cable or satellite distribution within residences, DTT reception poor with portable aerial)
- As analogue signals are switched off many students will be unable to receive even basic channels including BBC, ITV, C4 and Five
- Many Universities blocking access (on a University level) to all other streaming and media websites, including P2P solutions such as iPlayer & 4OD
- All rooms are connected to the JANET network operated by UKERNA
 - JANET connects Universities, Colleges, Schools and other public bodies
 - Over 18 million end-users are currently served by the JANET network

VIDEO OVER CLOSED NETWORKS

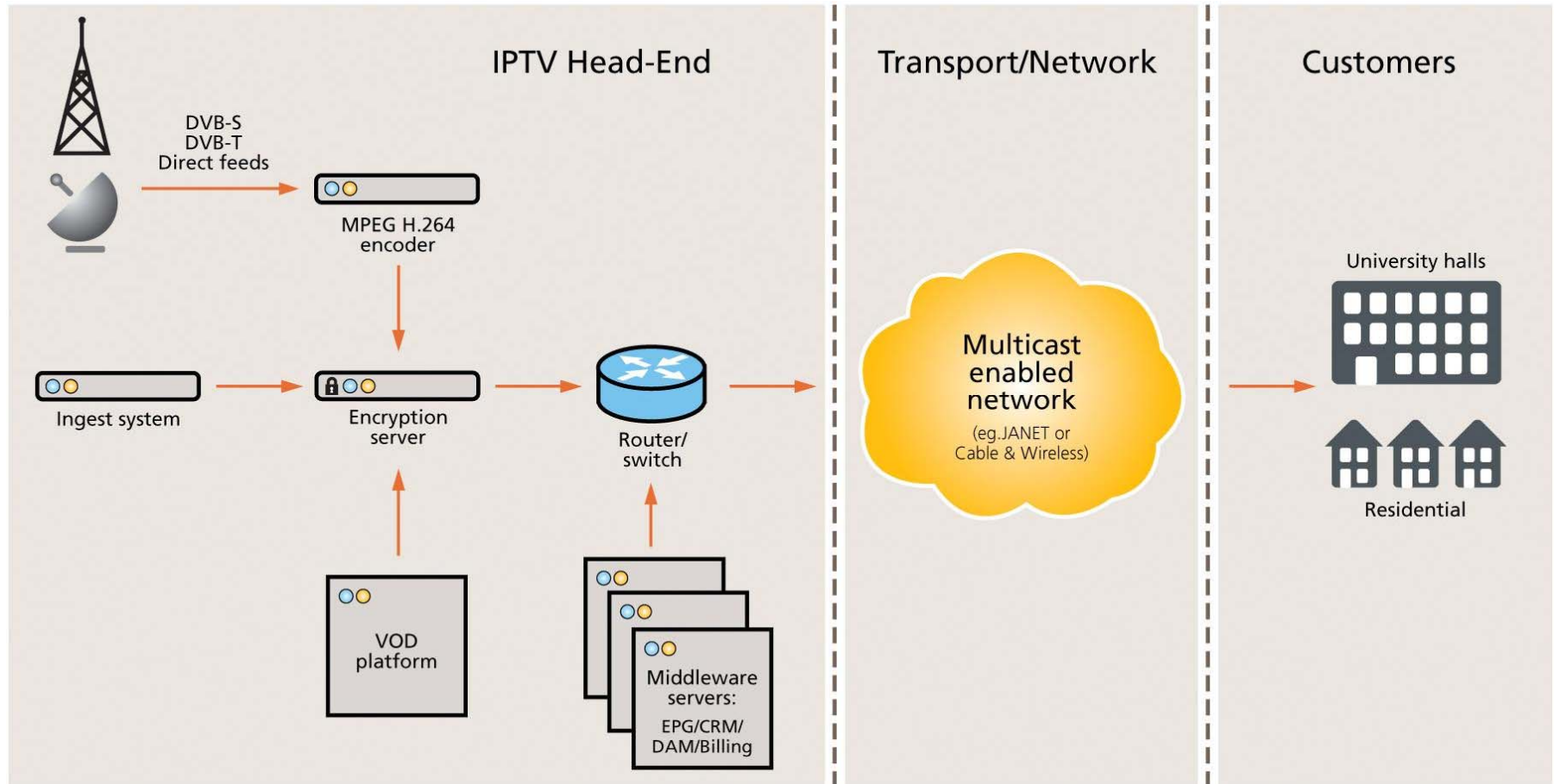
- On a university level the 'local network' gatekeepers are implementing blocks on other video services to help manage bandwidth
- Although not blocked in all Universities the growth of online video services is increasing the number of Universities where it is controlled
- Multicast video and audio services are made available via their partner 'Freewire', along with a 'recommended' VOIP service
- Multicast considered the "network friendly" solution for video over closed networks



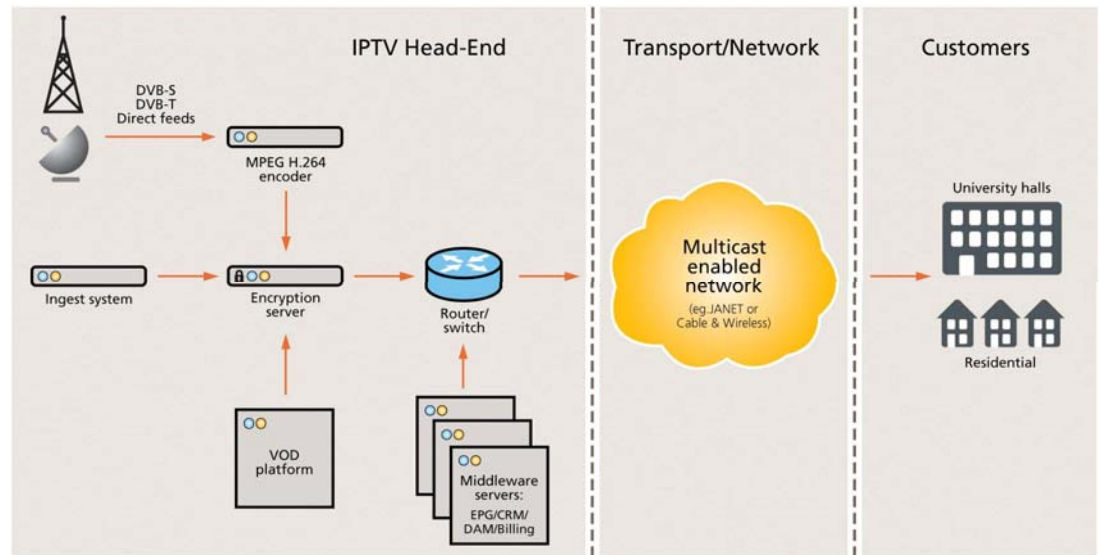
You are not permitted to:

- Connect to ResNet without following the [instructions](#). Read the [instructions](#) before connecting to ResNet;
- Download or stream films, movies, television programmes or video clips (including the use of BBC iPlayer, 4 on Demand, Sky AnyTime, YouTube);
- Use [peer to peer software](#); (including Limewire, BitComet, DC++ among others) **Be safe; remove the software, it may otherwise stay active;**
- Use Computers on ResNet without automatically updating [anti-virus software](#) installed. We provide suitable, preferred [anti-virus software](#) free of charge.
- Use more than 128kbit/s of bandwidth consistently for significant periods of time (over 1 hour).

HOW IT WORKS (*the simple version!*)

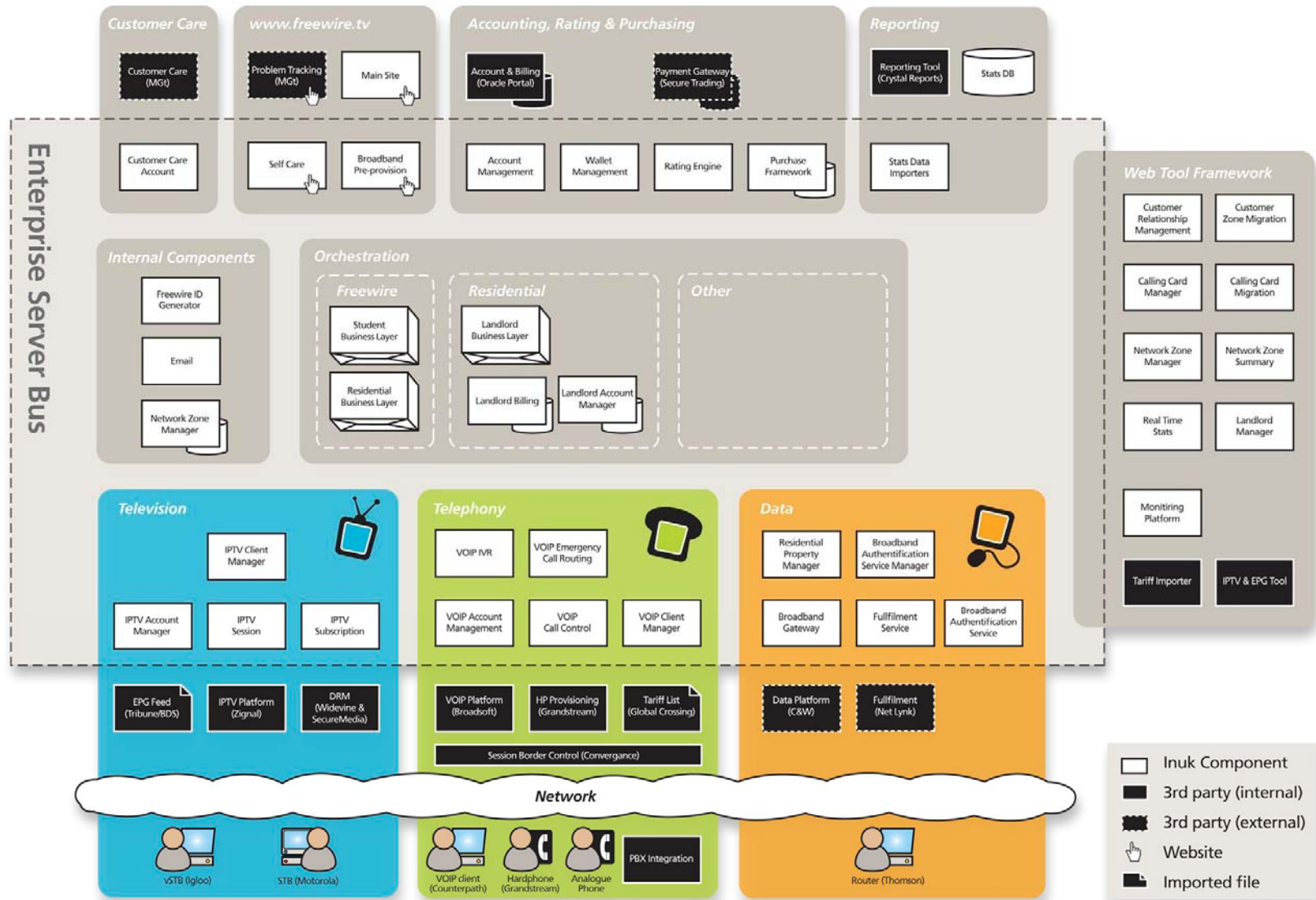


- Inuk delivers Freewire over IP-based multicast enabled closed networks
- Currently Inuk is delivering services over two closed networks:
 - JANET for students living on campus
 - Cable & Wireless LLU for students living in private accommodation



- Channels delivered at full D1 broadcast quality (MPEG4 @ 2.0Mbps) from Inuk's headend located at London's Docklands
- Channels ingested using Tandberg professional IRDs, and encoded into H.264 using Skystream encoders
- Zignal middleware servers provide user authentication, channel details, schedule information, and user tracking
- Encryption / conditional access provided by Secure Media

HOW IT WORKS (*the complete picture!*)



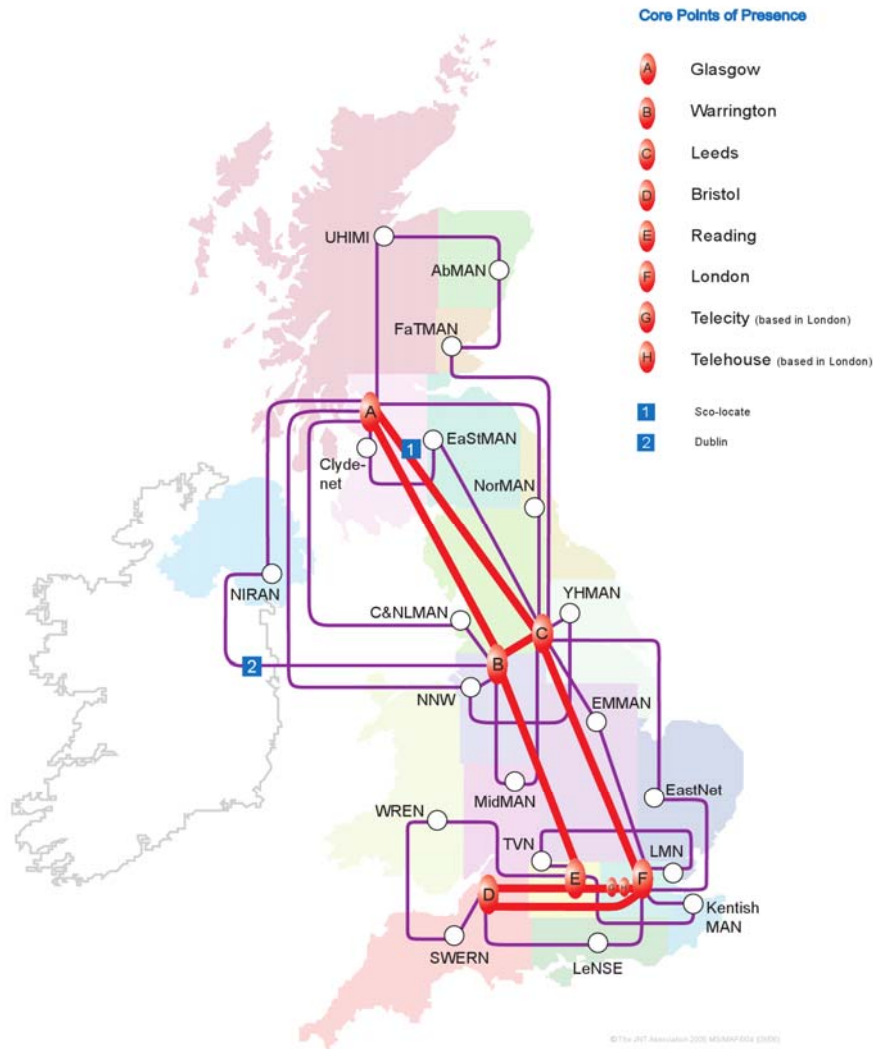


DELIVERING TO TV AND PC



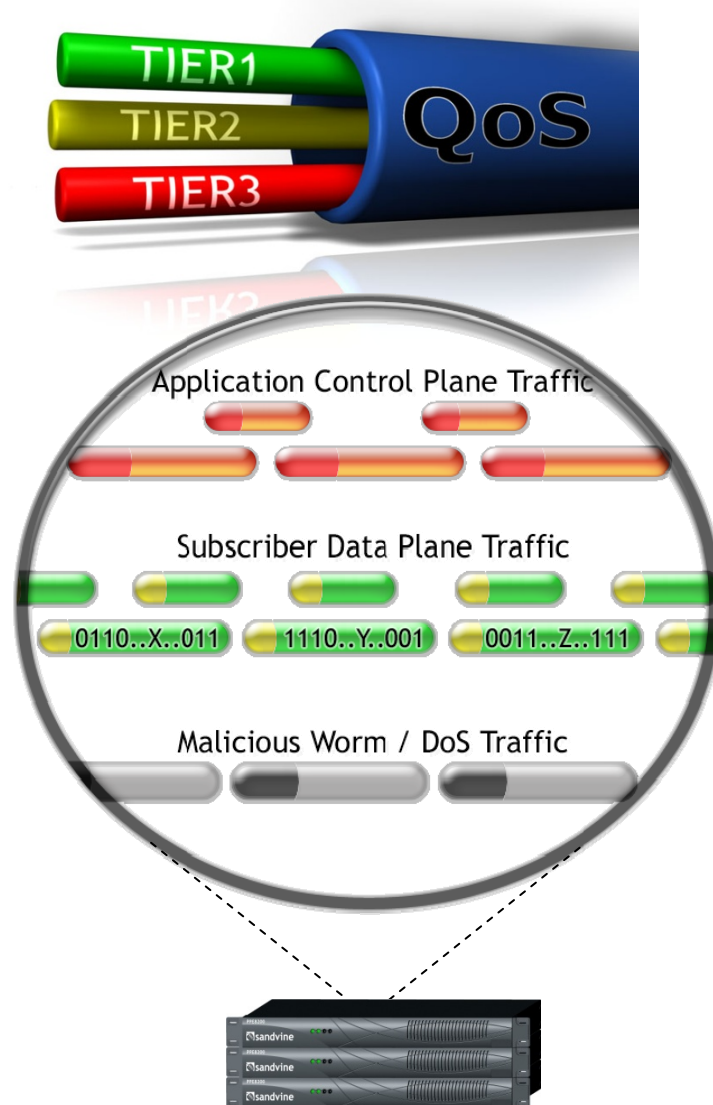
- Set-Top Box (STB) for delivery to TV sets, including Electronic Programme Guide (EPG)
- Supports HD
- Inuk has developed unique Virtual Set-Top Box (vSTB) application for PCs and Macs called “Igloo”:
 - Viewing experience identical to TV/STB
 - Broadcast quality MPEG4 viewer
 - Mini-view and full screen modes
 - IR-USB remote control
- Multicast delivery identical in stream and quality for TV/STB and PC/vSTB
- PVR functionality using existing internal hard disk

HOW IT WORKS (*the network bits!*)



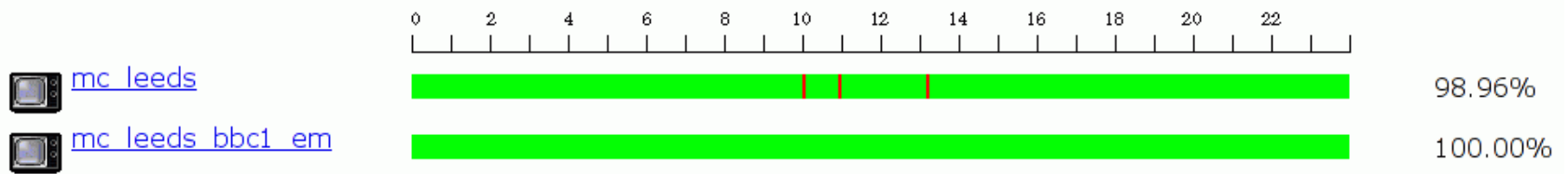
- JANET is a 40Gb/s ring around the UK
 - Links 8 Core PoPs
 - Provides all external connectivity
- 19 Regional Network Operators (RNO)
 - Each connects to two JANET PoPs (either directly or via another RNO)
 - Provides link between Universities (and other educational establishments) and JANET
- Inuk interconnects with JANET in London for both Multicast and Unicast traffic

- For some universities, already experienced with multicast, Freewire “just worked”
- For others, Inuk had to help with deployment:
 - LAN multicast configuration (e.g. IGMP, fast leaves/joins, static joins etc.)
 - Often support for RNOs too (e.g. PIM rendezvous points)
- Local challenges:
 - Various packet shapers (NetEnforcer, Packeteer, Cisco SCE, TippingPoint etc.) and policies
 - Firewall configuration and policy: many universities allow multicast to bypass firewall
- But you need QoS for IPTV, right??
 - QoS on JANET and RNOs has not been necessary
 - Universities take mixed approach but QoS needed more for packet loss (or order!) than for jitter and latency

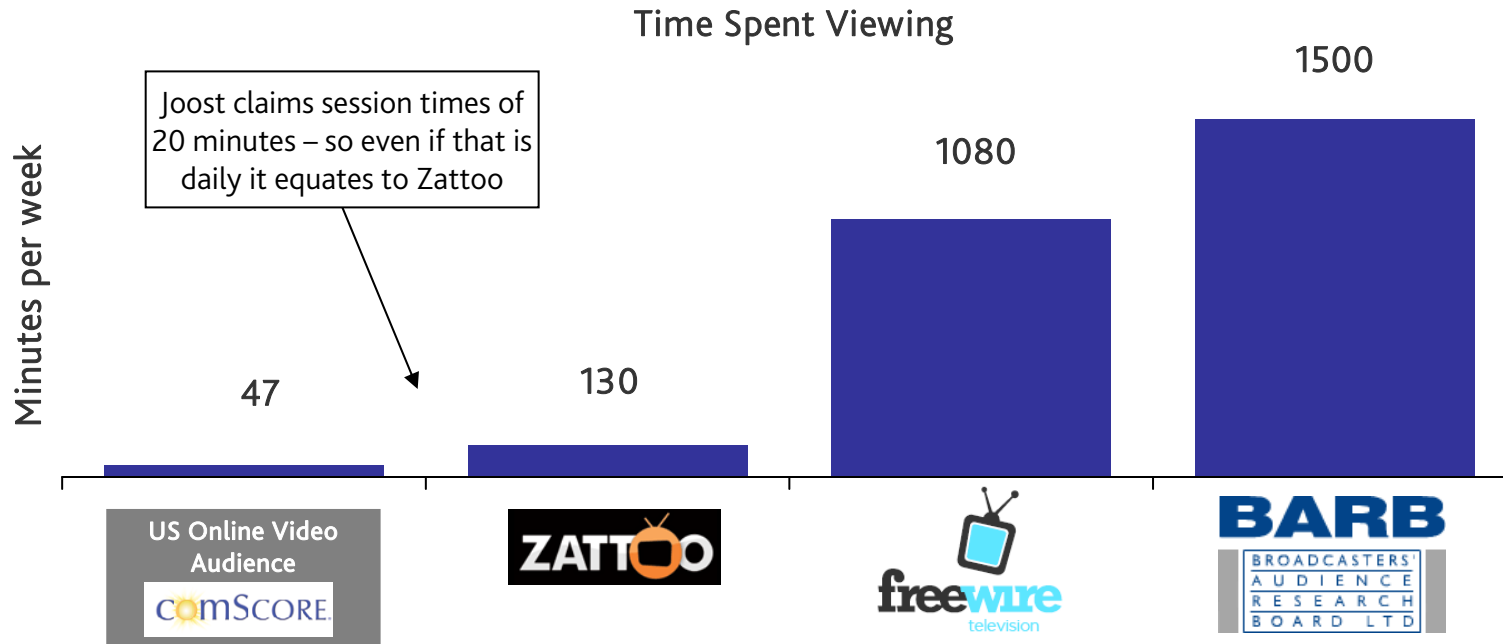


- Finger Pointing
 - University phones us to say it's not working
 - We diagnose and determine that it's not the University, so they escalate to RNO
 - RNO says it's our fault or JANET's fault
 - We speak to JANET
 - JANET says it's the RNO's fault
 - Problem eventually gets fixed (or magically goes away...)
- Remote Monitoring is very useful!
 - We've deployed a number of remote monitoring nodes (1U Linux PCs)
 - Running in-house software which detects and analyses transport streams
 - Allows us to pin-point problems

[\[All\]](#) [\[Root\]](#) / [Inuk Infrastructure](#) / [Multicast Streams at Customer Sites](#) / [University of Leeds](#) /

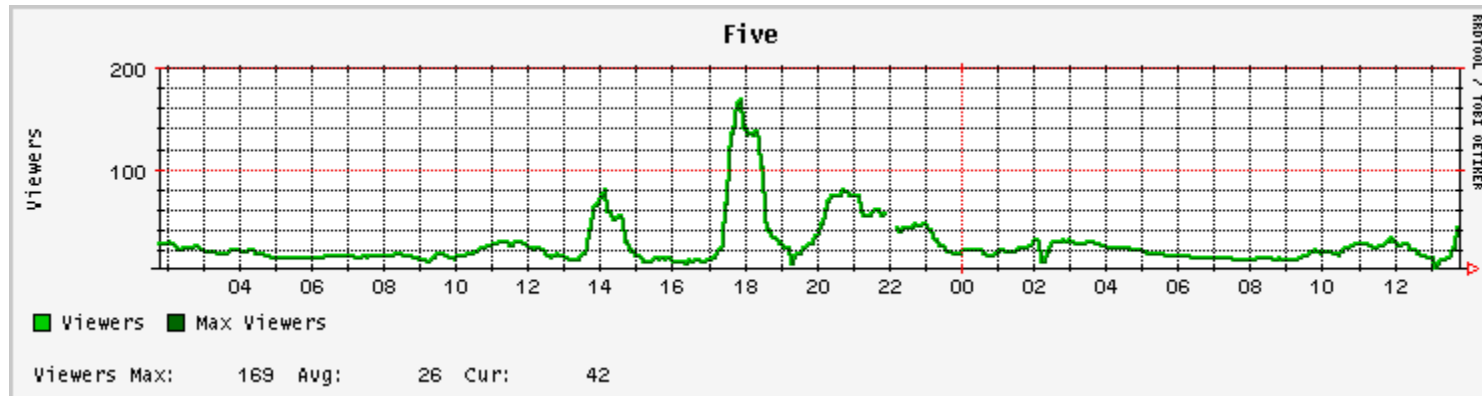


STUDENTS VOTE WITH THEIR TIME !



- Freewire viewing is Television...not Internet TV
- Comparison is difficult – data from Internet sources of questionable validity – but Inuk behaviour is very much TV based

- But how do we know that?
 - Multicast is unidirectional
 - But, it's IP so we've got a backchannel
 - Client reports channel changes back to middleware server



- Broadcasters love this!
 - Far more accurate than current sample-based audience figures
- Advertisers love it too...

TARGETED ADVERTISING

- Freewire provides a platform for truly targeted interactive TV Advertising
- Partnering with PacketVision, Inuk began delivering targeted ad insertion with Channel 4 during Oct 2007
- Personalisation allows demographic ad insertion at the “edge” which is more efficient in terms of bandwidth
- Initial campaigns have replaced “mainstream” ads with student focussed advertising
- Inuk reporting actual viewed impacts, by gender and geography
- Next phase will deliver different commercials based on gender, location and degree subject



Brand:



Creative Agency:



Media Agency:



Channel:



Platform:



TARGETED ADVERTISING

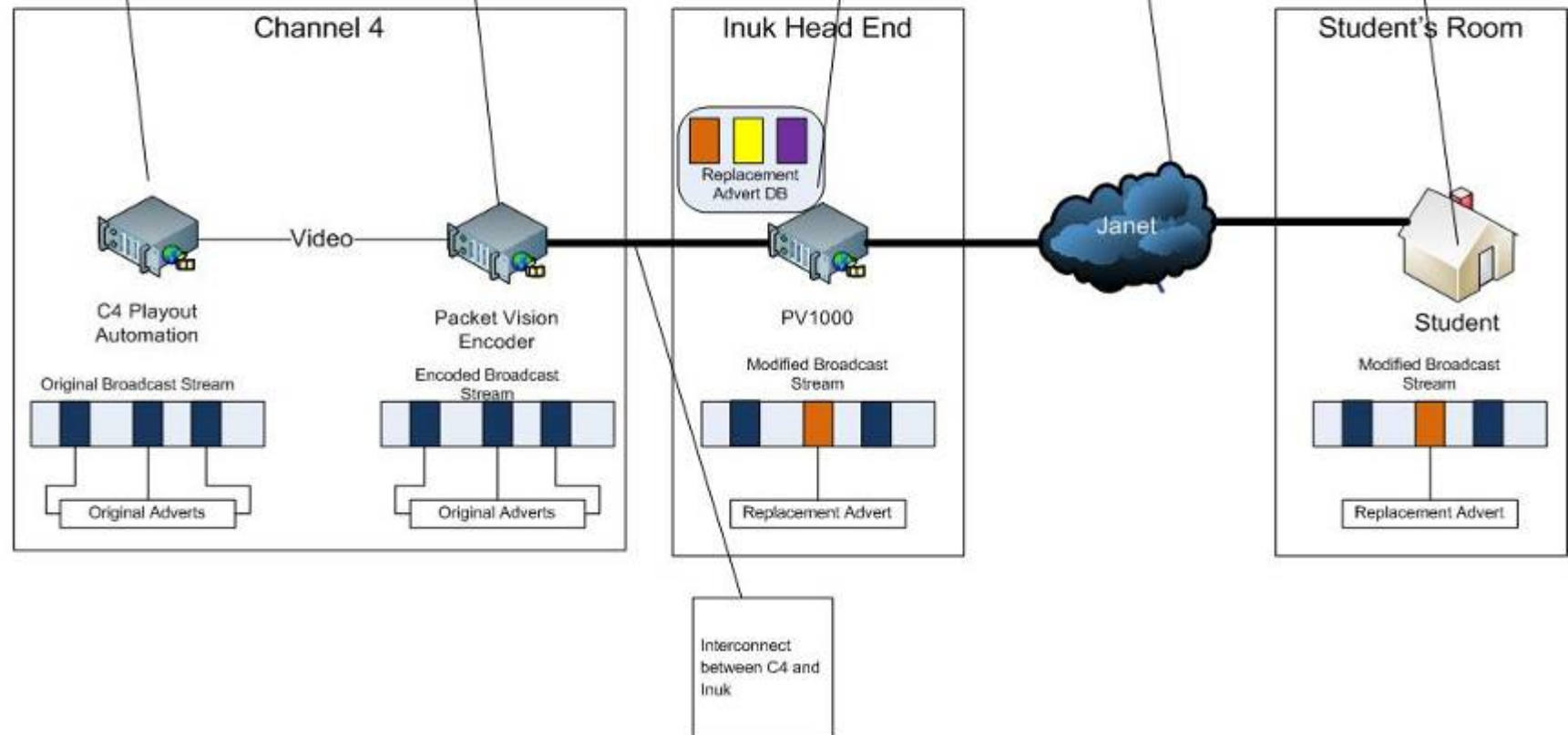
Step 1: Channel 4's playout automation system sends the original broadcast to the Packet Vision Encoder as well as the signal to mark the start of an advert break.

Step 2: The Packet Vision Encoder converts the video stream into the required format including the advert break markers known as cue tones.

Step 3: The PV1000 waits for a cue tone. Once received it replaces the video stream with a video asset stored in its database. After the asset has played it resumes the broadcast stream.

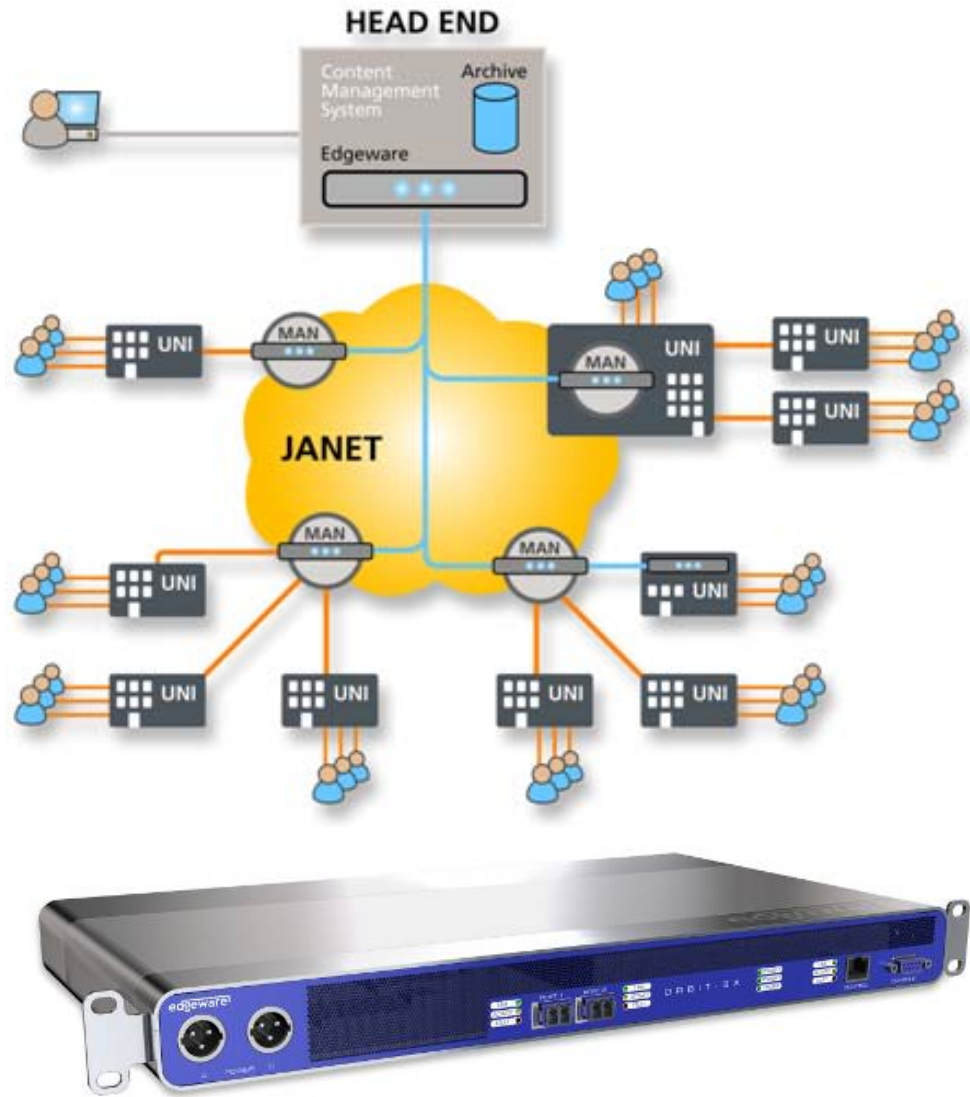
Step 4: A single broadcast stream is distributed over the JANET network regardless of whether the stream is coming from PV1000 or C4.

Step 5: The student simply tunes into the C4 multicast stream totally unaware that the advert they are watching is a replacement for one in the original stream.



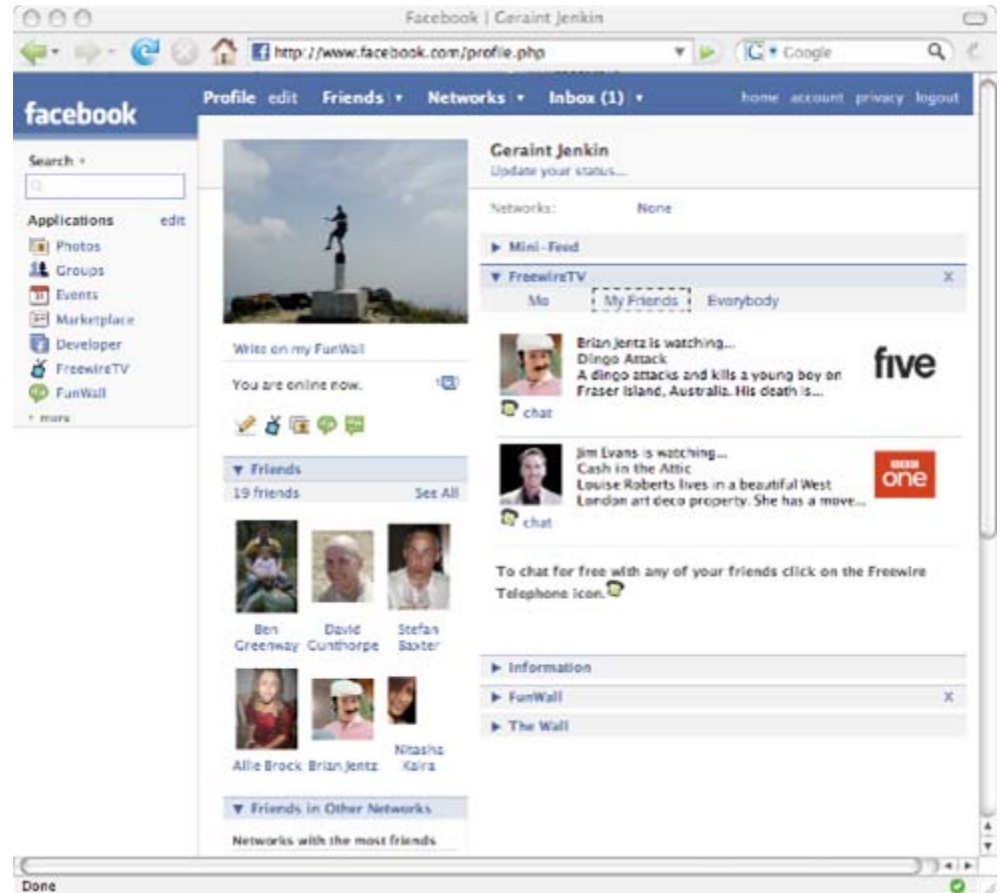
ADDING ON-DEMAND CONTENT

- Video on Demand proposition required to deliver entertainment content but also university and student generated content
- Linear TV solution uses “network friendly” multicast but how can a unicast service exist on closed networks?
- Inuk building distributed VOD architecture, with 1U Edgware servers:
 - 8,192 fully concurrent streams
 - 4 TBytes NAND Flash
 - up to 1,850 hours of video @ 3.7 Mbps (SDTV)
- Plus we’re working on multicast trickle-feed for prime content...

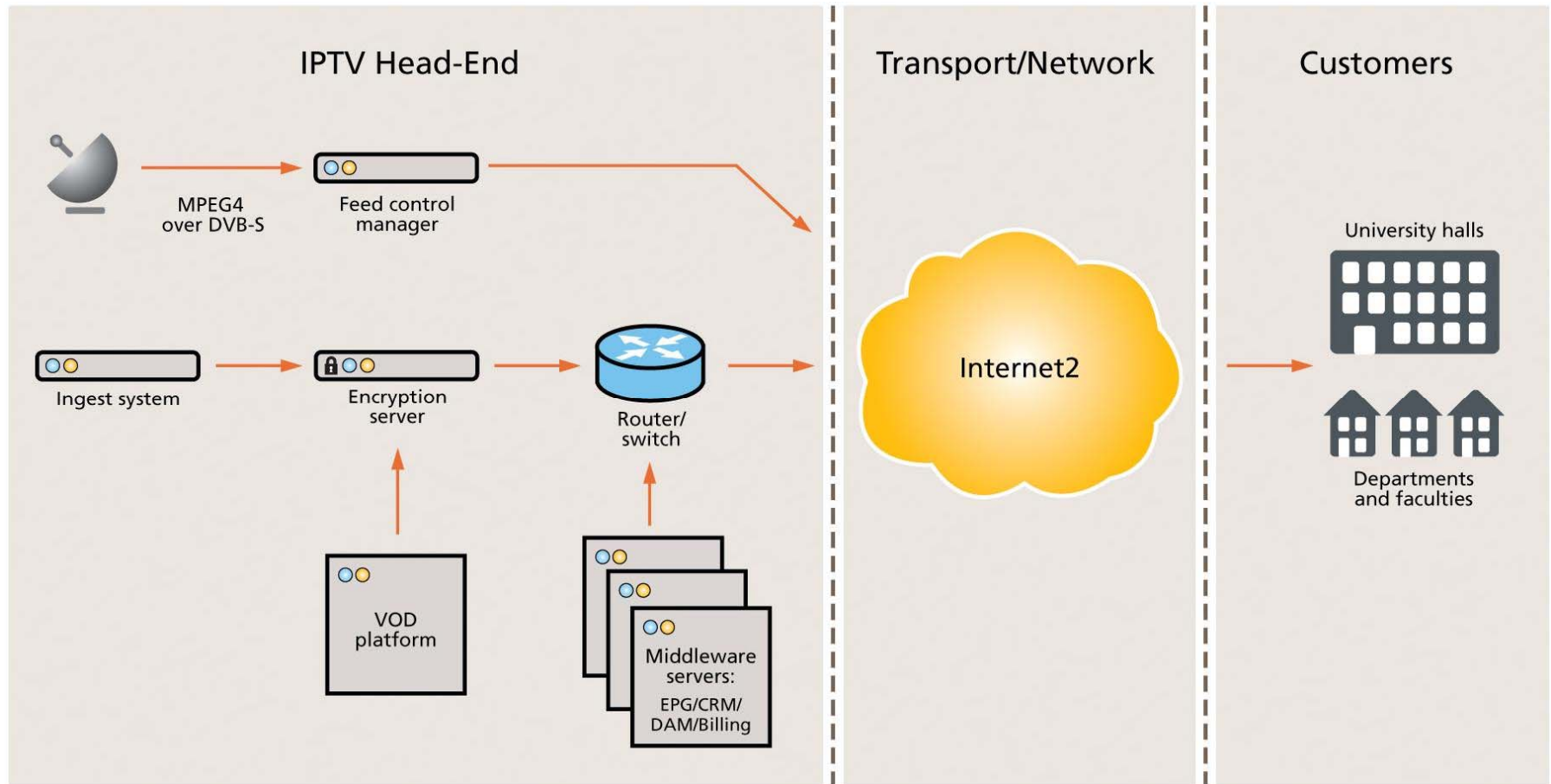


SOCIAL NETWORKING INTEGRATION

- Inuk developing “in-bound” and “out-bound” widgets to integrate new functionality into the Freewire interface and to export viewing data into third party sites & applications
- Out-bound example:
 - Facebook widget allows a student to see what their friends are watching, what are the most popular programs at any given time (“real time ratings”) and to initiate VoIP conversations
- In-bound examples:
 - Facebook “pokes” displayed on screen
 - Chat room functionality



BRINGING FREEWIRE TO THE USA



Anything Technical (i.e. me!):

Simon Lockhart

Simon.lockhart@inuknetworks.com

+44 1443 743850

Anything non-technical (i.e. you're interested in working with us...)

Shaun Illingworth

Shaun.illingworth@inuknetworks.com

613-271-8314

