# Over the Top/Under the Hood OTT Video over IP

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# Overview

- Introduction
  - Questions? Perspectives?
- (A little) Background about Penn and PVN
  - Why we chose an OTT solution
- So, what is "OTT"?
  - "And what makes you qualified to talk about it?"
- OTT Examples (Hardware and Interface)
  - Specifics of each option
  - Quality Comparison
- Findings at Penn

# Video over IP

- How many of you offer video over IP (streaming, on-demand capacity) on your campus broadband Ethernet network?

- How many of you have a broadband Ethernet network?

# How, When, With What

- Even if you don't have "on-demand, video over IP" as a service, students are using your network to watch TV, movies, and more:
  - How they want to watch it
  - When they want to watch it
  - With the device of their choosing

# PennNet and PVN

- PennNet: Penn Internet access
  - Wired Ethernet
    - 10Mbs to wallplate (throttled)
    - Wireless issues
- Penn Video Network
  - HFC distribution network on campus (ca 1994)
  - ~8000 drops / ~60 channels / 550MHz
    - Yes to Digital and *some* HD (QAM)

# Why OTT at Penn?

- Past "failures"
  - Inuk/Internet 2 project
  - No clear winner in IP Video *for us*
- After 2 years…
  - Why duplicate existing service?
    - Cable TV already successful
  - Supplemental lineup more appealing
  - "Who wants it?"

# Over the Top

- (In this case) Set-top box designed for media display using an Internet network input for data/packet retrieval

- Three examples:
    - AppleTV (Apple)
    - Boxee Box (D-Link)
    - Roku HD (Roku)

# Long Walks and Cute Animals

- ***Not*** an engineer!
- TV-watching habits
  - I like TV! (But not so much "live")
  - Media saturation from multiple sources
    - Laptop, smartphone, game systems, TV (sort of)

- Opinionated. Cheap. Impatient. Me ~ Average student viewer?

# Little Bit o'This, Little Bit o'That

## AppleTV  v.  Boxee  v.  Roku

- Comparison and Findings
  - Connection/Output options
    - All wired connections
  - Hardware design
  - Ease of use

  - *Get ready for some personal bias!*

# AppleTV

- Slick design and user interface
- Link to your Apple everything (iTunes, iMovie, etc.)
- Fair number of media apps (Netflix, YouTube, Flickr, iTunes); also rental/purchase
- HDMI out (*rassa-frassa-!* No Cable Provided?!); Optical out
- 720p
- No enterprise wireless

# Boxee Box

- Odd design / Big
- Keyboard remote
- HDMI out (cable provided); Optical out
- 1080p and 1080i
- Many, many apps / channels
  - Favor "freebies" like YouTube, TED, Khan Academy
- Essentially designed to replace PC running Boxee software

# Roku HD

- Functional design - Streaming Media Player
- Basic remote and Interface
- 720p (later models go to 1080p)
- Most output options (HDMI, S-video, Composite, Component; Optical); basic cables provided
- Mid-range "Channel" options
    - Netflix, Hulu Plus, NHL, MLB, Amazon video
    - Pandora, iTunes
    - Higher-ed-specific (see TelVue)

# OTT Baseline Comparison

| | AppleTV | Boxee | Roku |
|---|---|---|---|
| Wired | X | X | X |
| Wireless | X | X | X |
| Outputs | HDMI; Optical | HDMI; Optical | HDMI, S-video, Composite, Component; Optical |
| # of Apps | Lowest | Highest | Mid-range |
| Home Networking | X | X | N/A |
| Resolution | 720p | 1080p/i | 720p (1080p) |
| Pricepoint | ~$99 | $150 | ~$80-$130 |

# OTT Biased Comparison

| | AppleTV | Boxee | Roku |
|---|---|---|---|
| Hardware | No HDMI cable? *Really?* | Annoying design | Bare bones |
| Interface | Pretty, but unintuitive | So. Many. Apps! Remote keyboard unhelpful | Boring |
| Picture quality | Best | Good | Better |
| Ease of setup | Good | Better | Best |
| Home Networking | + | + | - |
| Recommendation | Personal Preference | | |

# Did You Just Waste My Time?

- All OTTs specializing in digital media reception and streaming do *essentially* the same thing

- AppleTV, Boxee, Chumby, GoogleTV, Orb, PS3, Roku, Wii, XBOX 360 … !

- Which one best matches your - or your students' - needs and wants?

# Penn Findings

- No noticeable blips on network
  - No control group or testing
- Needed to educate students about registration
  - Not exactly as easy as "plug-and-play"
  - Same as any other Internet device
  - Largest percentage of registered "peripheral" Internet devices (not computers) was XBOX 360 @ 30%

# All About the Benjamins

*…and the Benitas!*

- Students want what they want: What's in the box, not the box itself!
    - Students don't think, "I want to watch Showtime tonight!" They think, "I want to watch 'Dexter' tonight!"

# K.I.S.S.

- Penn opted for a solution that was *extremely* low-cost - for us, and for them - with OTT recommendations
  - Mom and Dad already have Comcast, Time Warner, FiOS, Dish, DirecTV at home - many are also available to students (remotely)
    - Education issue
    - HBO Go very successful example
    - Talk to your vendors about on-demand options

# What is the Answer?

- IP Video *is* the future …
  … But how far away?
  - Over IP? In "The Cloud?"
- Existing OTT services are a stop-gap solution
  - No clear "winner" in the race of which service is best
- If you want to take a cautious approach to Video over IP, OTT is *one* way to do it.

# Q & A / Hands-On

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@ the AHECTA booth in the Exhibit
Hall