IPTV
Technology, Trends and Challenges
EE233 Class Presentation

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Outline

The “WWW” of IPTV

- What is IPTV?
- Why IPTV?
- When IPTV?
What is IPTV

IPTV: Internet Protocol Television

Television through Internet
Why IPTV

The “AAA” of what consumers want??

Content

Any where  Any time  Any device
Why IPTV?

Digitizing the info enables the AAA’s easily

Source Sanford Bernstein & Co.
Why IPTV?

Imagine a World

- Video on Demand with hundreds of Channels
- Interactive program guide
- Picture-in-Picture
- Search Functionality
- Event Notification
- Integrated Caller I.D.
- Integration w/ Data
- Multiple Angle/Pictures
SBC/AT&T IPTV
Demonstration of Key Features
Worldwide Broadband Households by Region

10 million households/year in U.S alone
IPTV Market

Global IP Video Subscriber Forecast

Global IP Video Services Revenue

Source: MRG, Inc., 2003
Recent IPTV Roll outs

AT&T

- Offering IPTV to consumers in the San Antonio, Texas market.
- 200 channels, including ESPN, HBO, Disney, MTV, and CNN, along with video-on-demand titles and set-top boxes with DVR capabilities.
- AT&T also plans to allow customers with video-enabled cell phones to watch programs stored at home through a digital video recorder.
- In addition AT&T began offering fiber-based, high-speed Internet, but the fiber is not extended to homes.

VERIZON

- Began offering its fiber-based FiOS TV service in seven communities in North Texas.
- Verizon expects to have 400,000 subscribers in the North Texas area -- more than one million potential potential viewers.
IPTV: TECHNOLOGY
What is IPTV?

• What is IPTV?
  – Uses broadband internet for delivery of television programming.

• How is it different?
  – Digitally switched architecture, **NOT** channel based.
  – No tuning. Set top box (STB) decodes IP video. Content delivered as needed.
  – Interactive, personalized, robust.

• VOD vs IPTV
  IPTV is a type of VOD service
CATV Architecture (e.g. PON RF overlay)

- 54-870 MHz spectrum with 6 MHz bandwidth (~134 potential carriers)
  - Lower 65: analog
  - Upper 65: digital
- Entire bandwidth delivered to homes

IPTV Architecture

- Signals encoded and multicast via IP packets
- Digital encoding and decoding required
- Eliminate CATV lasers and EDFAs
- Efficient bandwidth use

Bandwidth Vs Length
Ethernet vs ATM (Asynchronous Transfer mode)

- Ethernet is dominant LAN technology while ATM is used in Internet Backbones
- ATM is a solution that fits all: WAN/MAN/LAN and offers higher QOS (Quality of Service)
- ATM is a complex technology that needs higher installation times and is also more costly
• National Headend
  – Pulls content from satellite and encodes video stream to compressed IP packets
  – Telco ownership of entire system ensures QoS
  – Multicast to local offices
    • Forward Error Correction to ensure delivery of packets
• **Local Office**
  - Mixes in local tv stations, advertising, VOD
  - **Middleware** handles
    - User authentication
    - Channel change requests
    - Billing
    - VOD requests
  - **Unicast VOD** via Real Time Streaming Protocol (RTSP)
• **Local Office** (continued…) - Bandwidth issues
  - Currently, AT&T offers 1.5-6Mbps high speed internet via DSL
  - Newest ADSL+ max bandwidth **25Mbps**
  - Delivery of multiple streams (for PIP, multiple program recording, multi TV households) required
  - Standard definition TV
    - 1-1.5 Mbps in Windows Media encoding
    - 3.5 Mbps in MPEG-2
  - High definition TV
    - 7-8 Mbps in Windows Media encoding
    - 18-20 Mbps in MPEG-2
  - MAJOR upgrades to infrastructure are required and underway (e.g. FTTH)
End User – Set Top Box (STB)
- Reassembles IP packets, decodes video
- Communicates with local office
- Change channels via IP Group Membership (IPGM v2) protocol to join multicast
IPTV: Economics
The IPTV Eco System

Content Provider (TV Channels)

Equipment Provider

Delivery Network

Software

Enabling Device
The Old TV Model

- Programs delivered through the cable or Satellite

How do different parties earn money?
Content – Advertisement
Distribution – Subscription
Equipment/Device – one time Buy
So, what’s wrong with this model?!

Not Movies with commercials but… commercials loaded with bits of movies

It’s a lose-lose situation for both content providers and consumers

John Wanamaker the pioneer of departmental store

“50% of my advertising expenditures are wasted. I just don’t know which 50%”

Increased sales of PVR reinforces this point
Delivery Network for TV

• The old ways
  Cable or Satellite

• The new ways
  Phone line, Cable, Satellite, FTTH

The battle is on between the Cable companies and Telecom companies
Why the battle??

- Every one wants a piece of others Pie

Revenue from wired network and Long distance Calls
Telcos vs Cables

**Telcos**

*Advantages*
- Huge installed network
- Trusted for its QoS

*Disadvantages*
- Existing infrastructure is low speed
- Need to obtain permissions from local communities to roll out service

**Cable**

*Advantages*
- Trusted delivery network for TV

*Disadvantages*
- Doesn’t have huge installed base
- Cannot support the huge upfront investments
Cost

Triple Play of Services

- Offer three services for less than $100

VolP + Internet + IPTV
Bottle Necks

• Installation costs high
• Customer Service

*European market research estimates that it costs €15-17 (US$18-20) for every customer call to a Customer Service Representative (CSR).*

• DRM (Digital Rights Management)
• New coding schemes to support high definition TV channels
Thank You !!

Questions ??
Existing ADSL Deployment Upgrade

**IP Television Up Front Costs ($)**
- Headend Encoders & Servers: $1,248K (-6%)
- Middleware: $275K
- BB Transport M/C Router & ADSL Host: $0 (100%)

**Total Cost $1,523M**
Savings 23%

**IP Television Deployment Costs ($/Subscriber)**
- Headend Encoders & Servers: $20 (35%)
- Middleware: $70 (18%)
- BB Transport M/C Router & ADSL Host: $125 (50%)
- ADSL Plug & Modem: $80
- 2 x STBs: $250
- Home Install: $315

**Total Cost $870**
Savings 18%

Source: Emvio, Inc., 2004 based on Emvio pricing through March 31, 2004
Back Up

Global DSL Subscriber Forecast

Millions

Source: MRG, Inc., 2003
Cable TV Bandwidth

- A single downstream 6 MHz television channel may support up to 27 Mbps of downstream data throughput from the cable headend using 64 QAM (quadrature amplitude modulation) transmission technology.
- Speeds can be boosted to 36 Mbps using 256 QAM.
- Upstream channels may deliver 500 Kbps to 10 Mbps from homes using 16QAM or QPSK (quadrature phase shift key) modulation techniques, depending on the amount of spectrum allocated for service.
- Using 64 QAM, upstream speeds can be raised to 30 Mbps.
- This upstream and downstream bandwidth is shared by the active data subscribers connected to a given cable network segment, typically 500 to 2,000 homes on a modern HFC network.