


IPTV
**Technology, Trends and
Challenges**
EE233 Class Presentation

William D. Hong
Bala Pesala



Outline

The “WWW” of IPTV

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

What is IPTV

IPTV: Internet Protocol Television

Television through Internet



Content



Internet



TV

Why IPTV

The “AAA” of what consumers want ??

Content



Any where



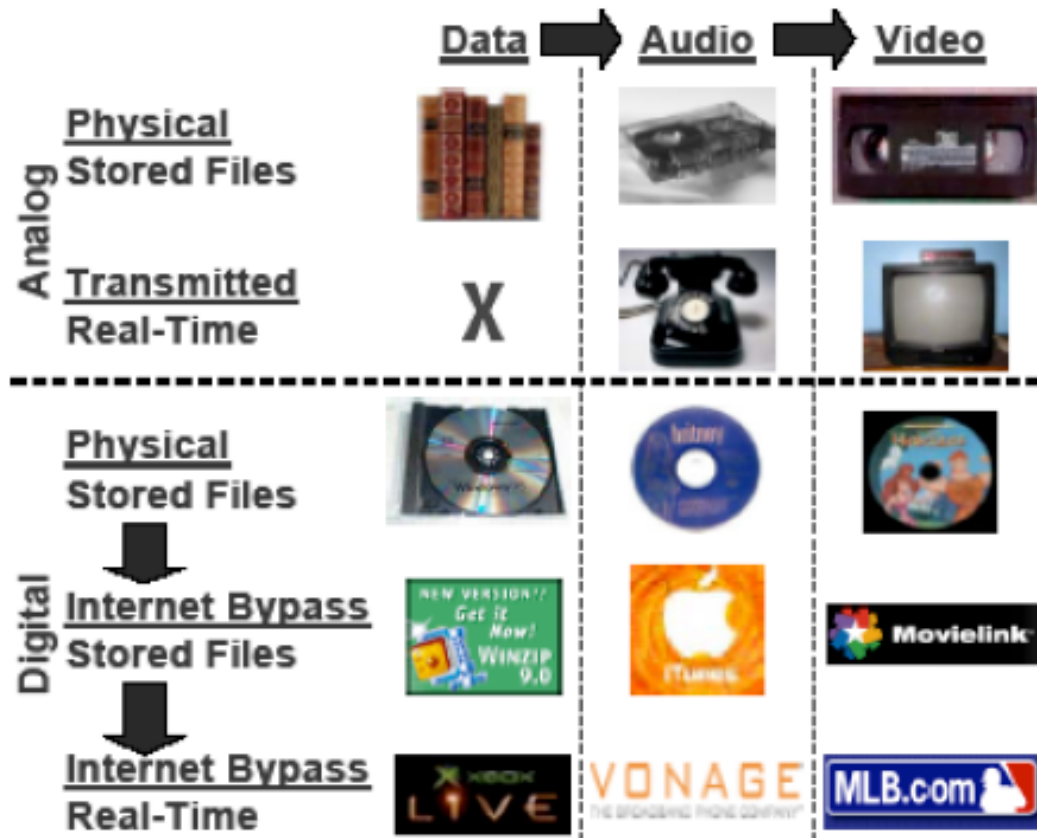
Any time



Any device

Why IPTV ?

Digitizing the info enables the AAA's easily



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

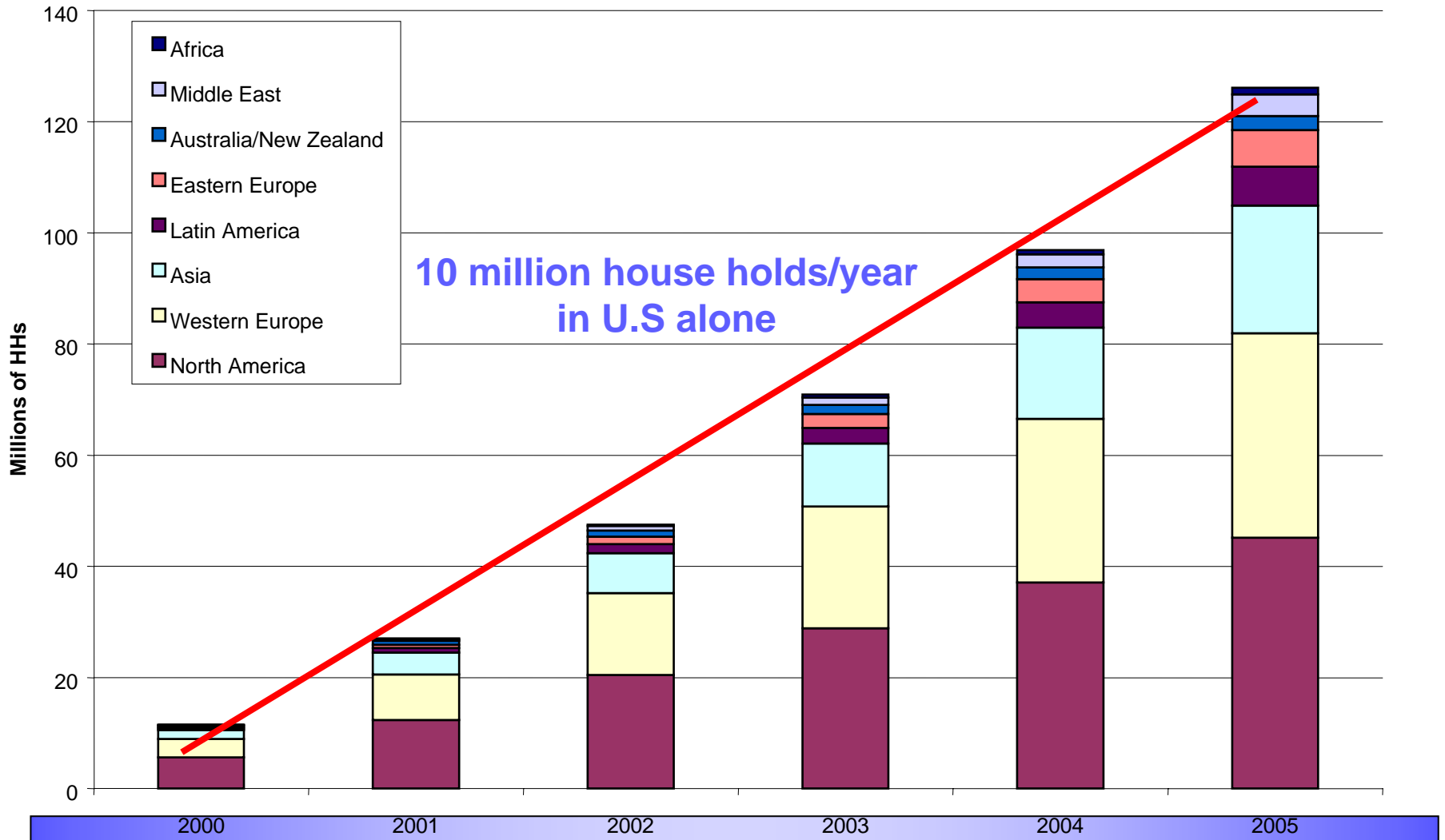
SBC/AT&T IPTV

Demonstration of Key Features



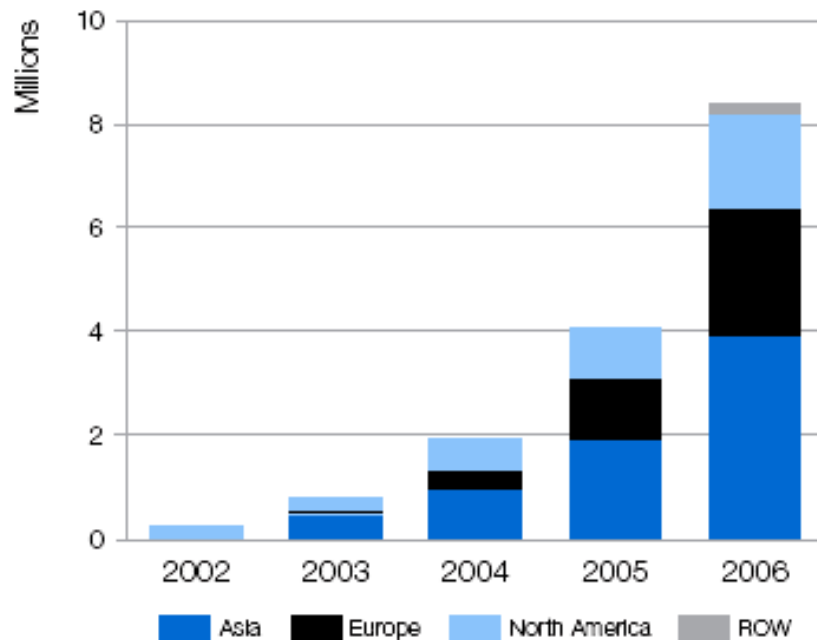
Program Guide
Search
Event Notification
Caller ID
Video on Demand
Photos
Multiple Picture-In-Picture

Worldwide Broadband Households by Region



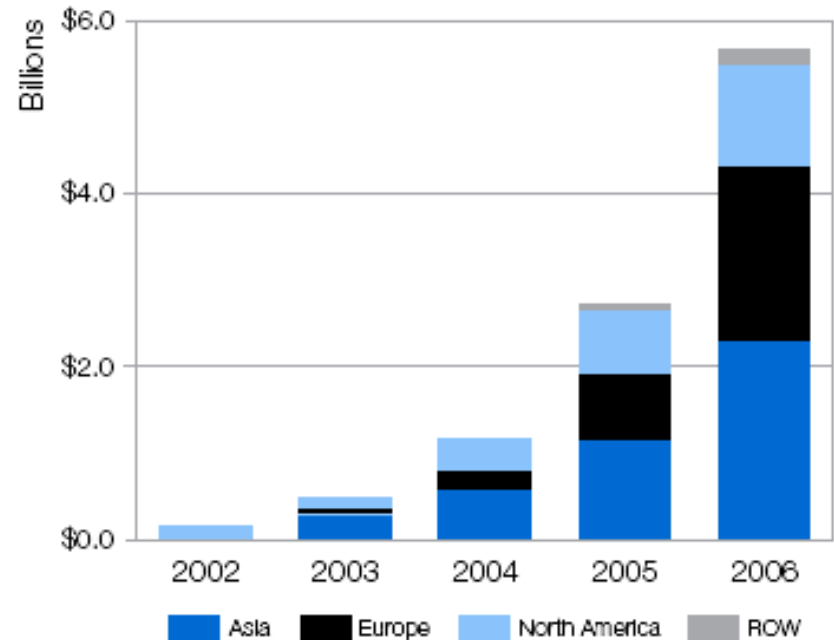
IPTV Market

Global IP Video Subscriber Forecast



Source: MRG, Inc., 2003

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 viewers.



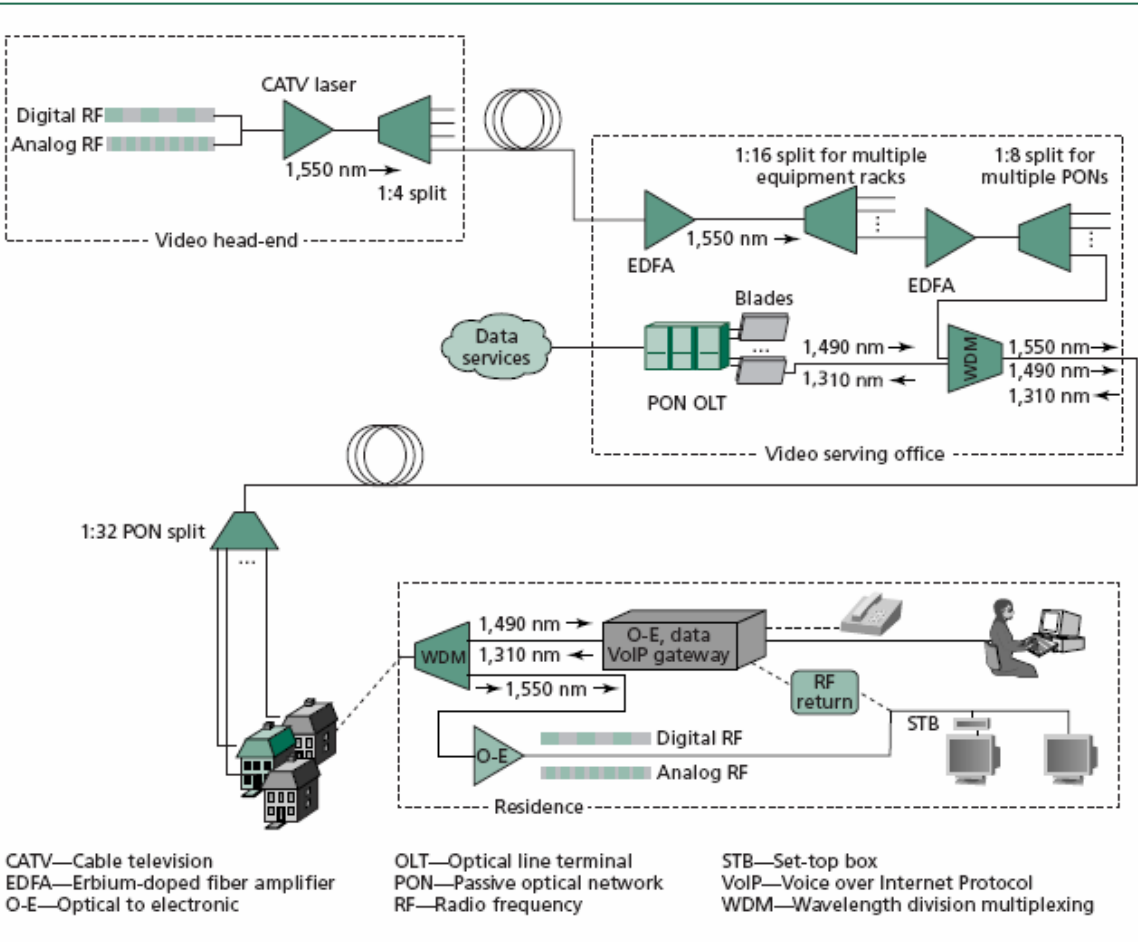
IPTV: TECHNOLOGY



What is IPTV?

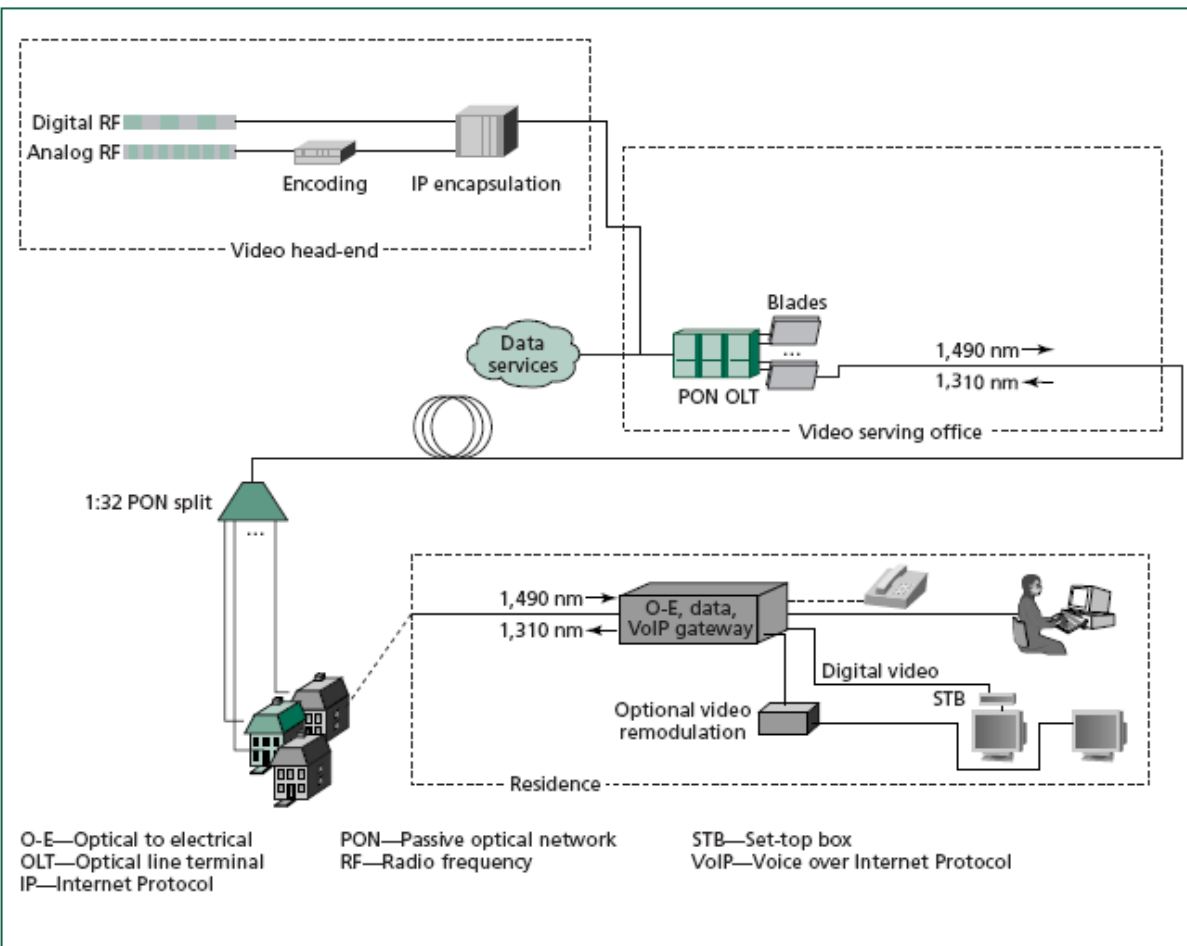
- What is IPTV?
 - Uses **broadband internet** for delivery of television programming.
- How is it different?
 - **Digitally switched** architecture, **NOT** channel based.
 - **No tuning**. Set top box (STB) decodes IP video. Content delivered as needed.
 - Interactive, personalized, robust.
- VOD vs IPTV
IPTV is a type of VOD service

CATV Architecture (e.g. PON RF overlay)



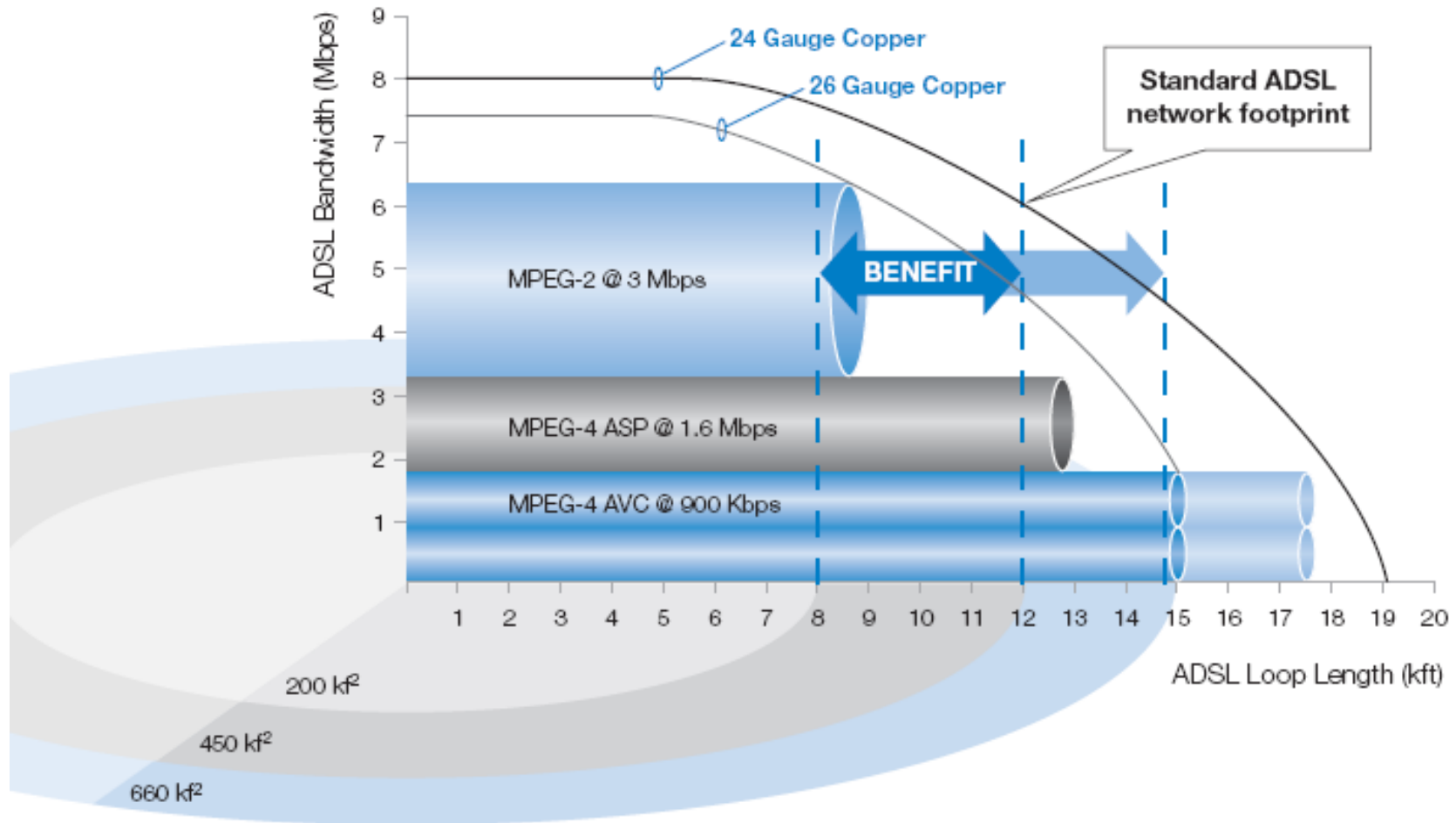
- 54-870 MHz spectrum with 6 MHz bandwidth (~134 potential carriers)
 - Lower 65: analog
 - Upper 65: digital
- Entire bandwidth delivered to homes

IPTV Architecture



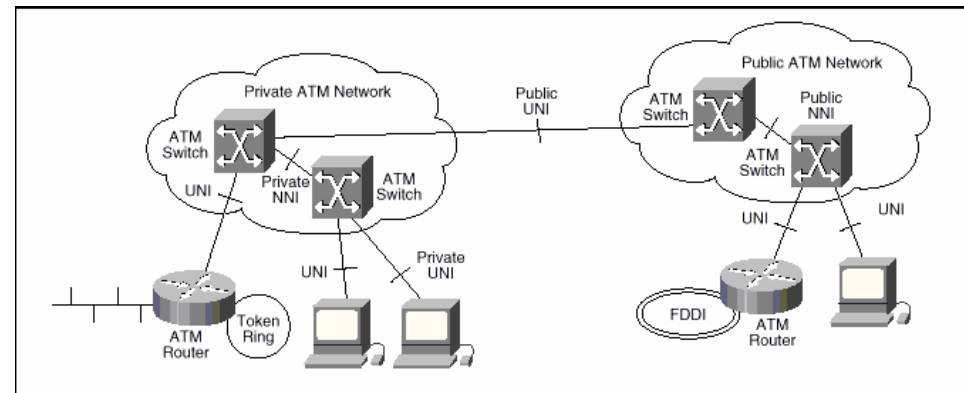
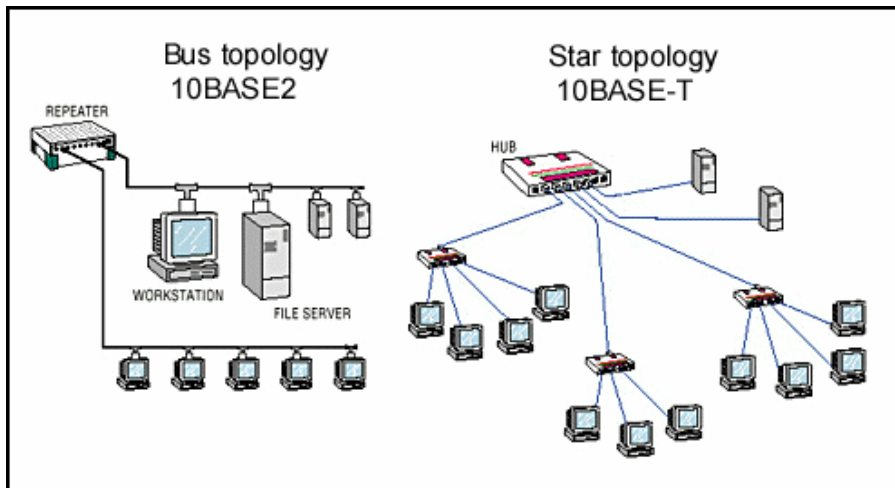
- Signals encoded and **multicast** via IP packets
- Digital encoding and decoding required
- Eliminate CATV lasers and EDFAs
- **Efficient** bandwidth use

Bandwidth Vs Length



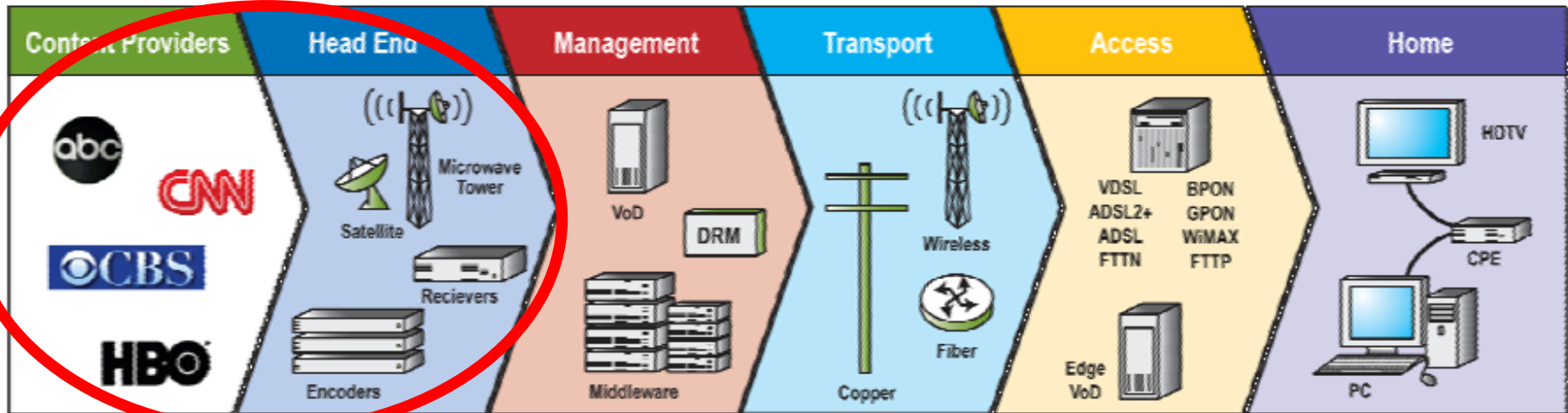
IPTV Broadcast Technologies

- 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

Technological Overview

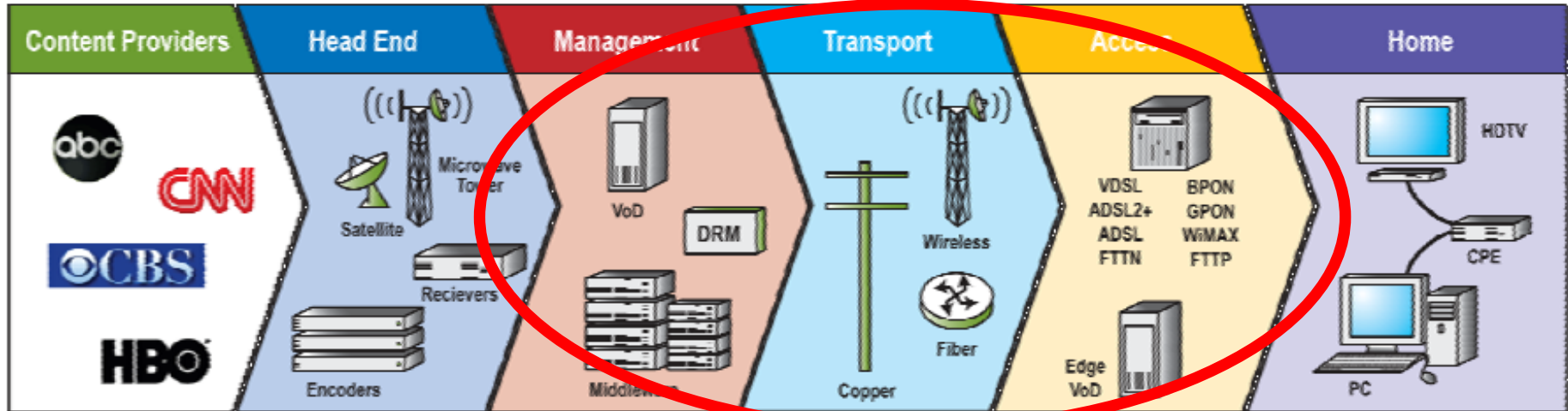


Supportsoft, "IPTV- The Clear Picture"

- **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

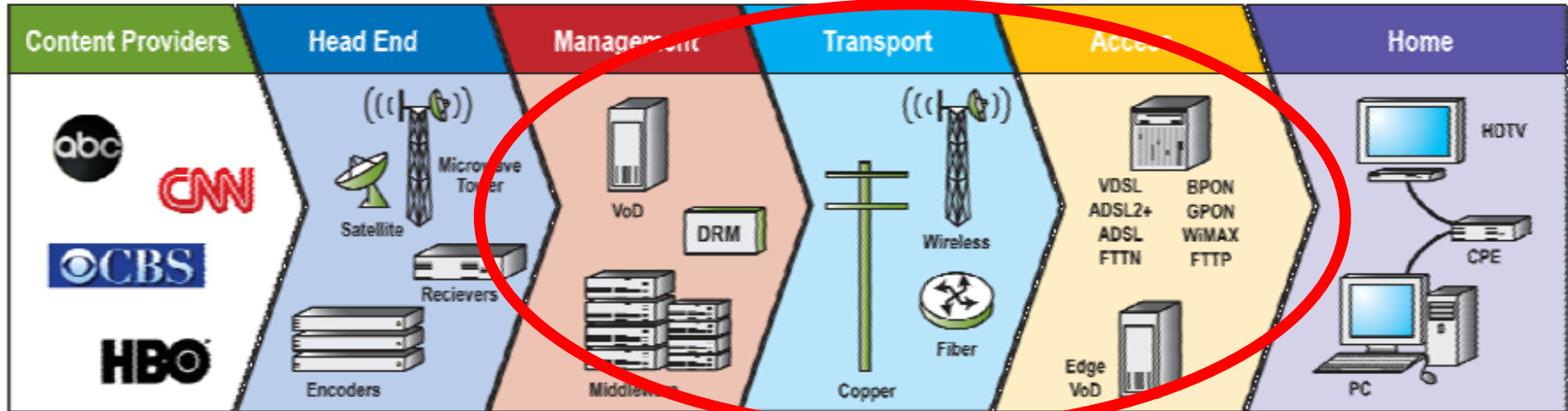
Technological Overview



Supportsoft, "IPTV- The Clear Picture"

- **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)

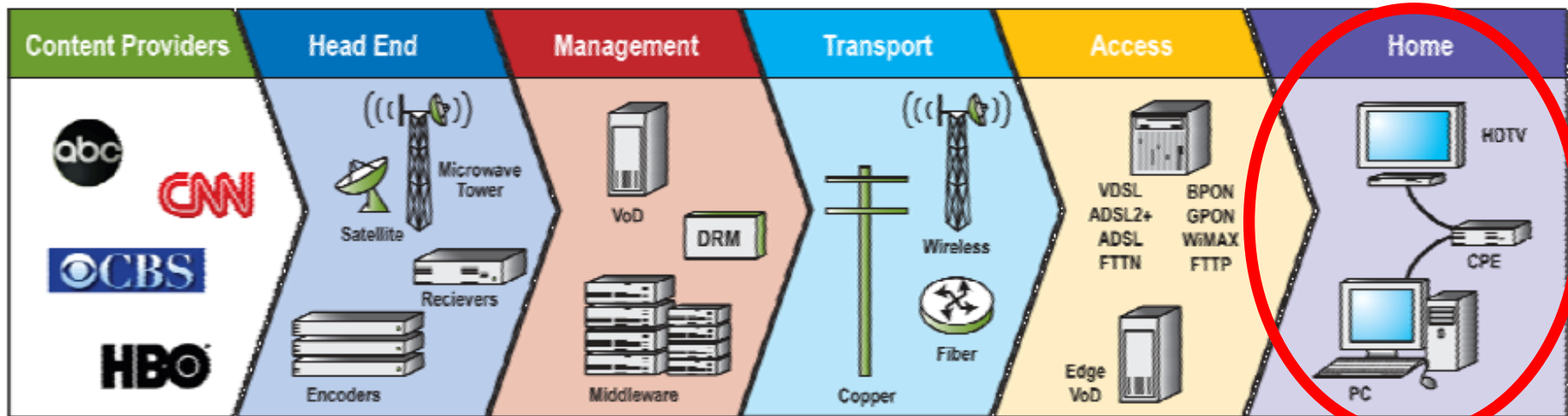
Technological Overview



Supportsoft, "IPTV- The Clear Picture"

- **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)

Technological Overview



Supportsoft, "IPTV- The Clear Picture"

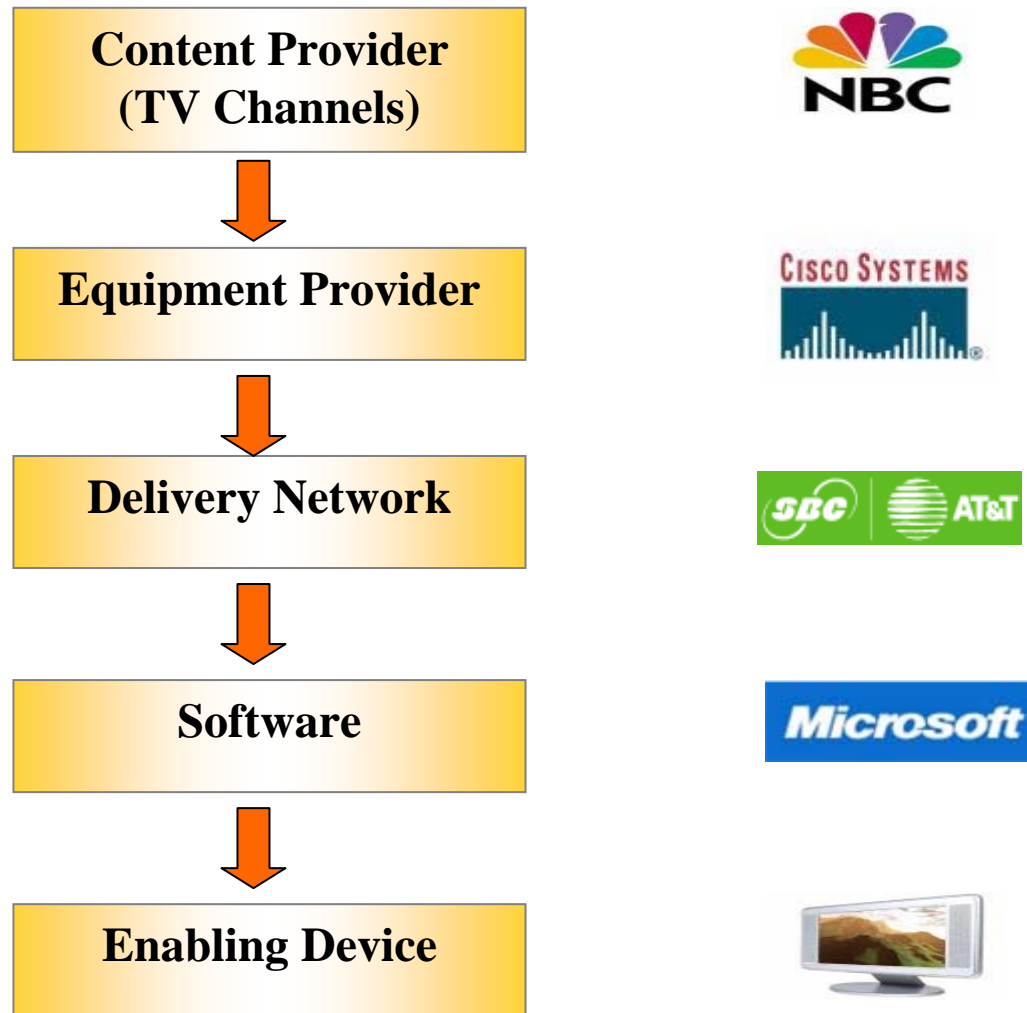
- **End User** – Set Top Box (STB)
 - Reassembles IP packets, decodes video
 - Communicates with local office
 - Change channels via IP Group Membership (IPGM v2) protocol to join multicast



IPTV: Economics



The IPTV Eco System



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



VoIPTV



Revenue from wired network and Long distance Calls

Telcos Vs Cables

Telcos

Advantages

- Huge installed network
- Trusted for it's 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

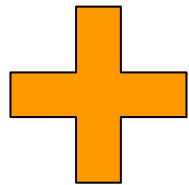
Cost

Triple Play of Services

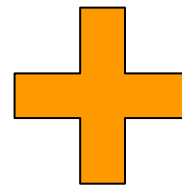
- Offer three services for less than \$100



VoIP



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 !!

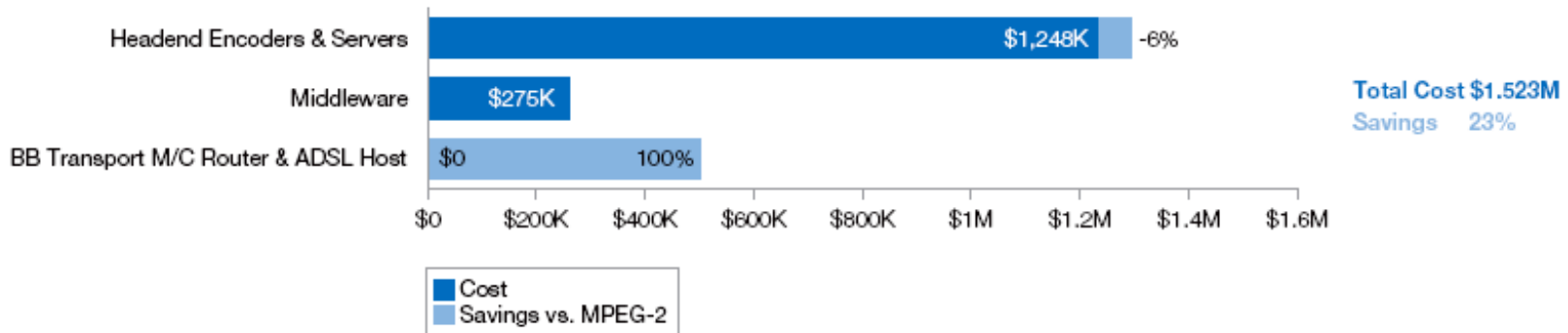
Questions ??



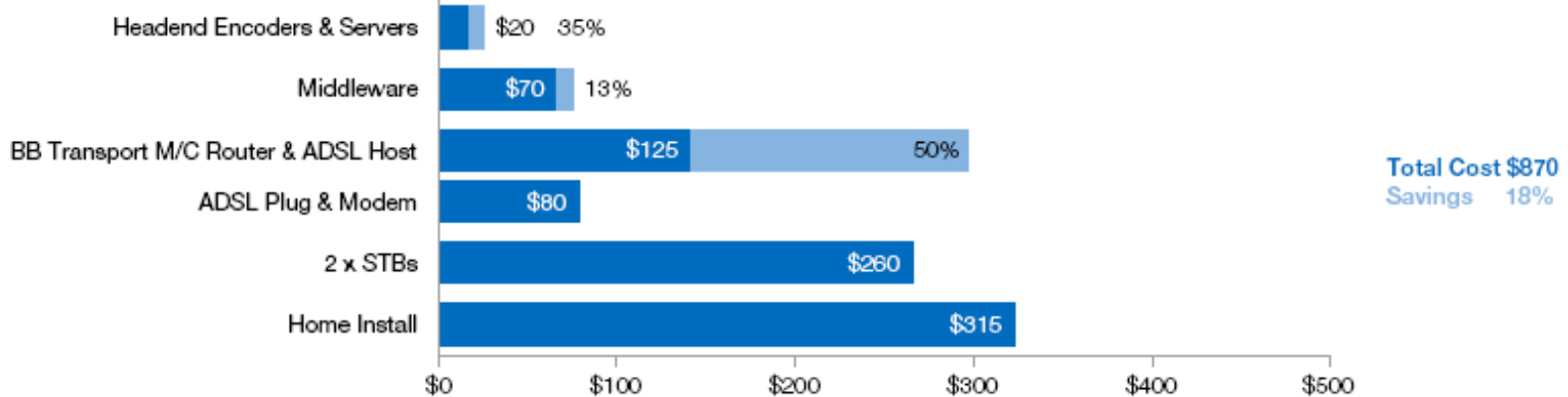
Back Up

Existing ADSL Deployment Upgrade

IP Television Up Front Costs (\$)

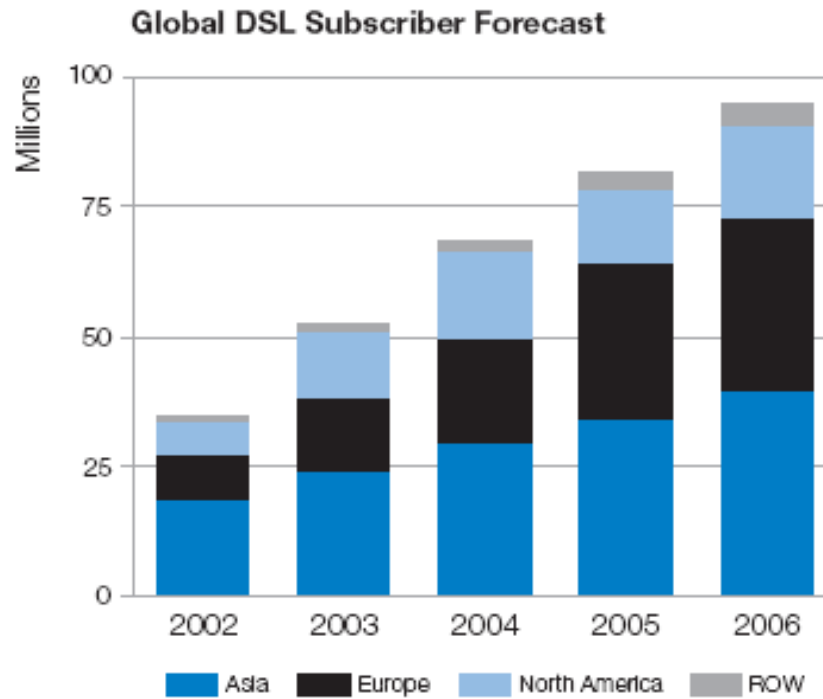


IP Television Deployment Costs (\$/Subscriber)



Source: EnVivo, Inc., 2004 based on EnVivo pricing through March 31, 2004

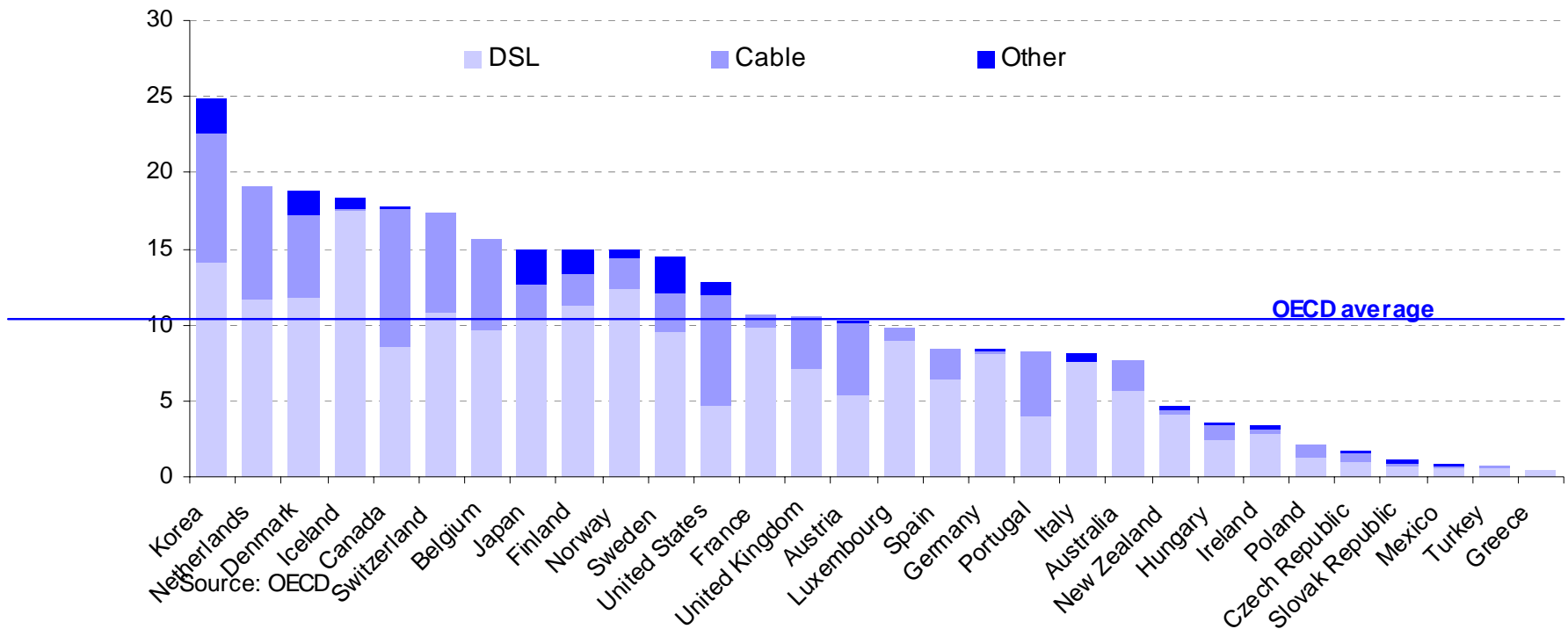
Back Up



Source: MRG, Inc., 2003

Back up

OECD Broadband subscribers per 100 inhabitants, by technology, December 2004



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.