Seizing the IPTV Opportunity

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Quiz #1 – Which is the best answer to:

What Is IPTV?

1) MPEG video delivered over UDP/IP
2) The protocol Telco’s use to deliver TV
3) An application platform for delivery of video-driven quad play services over IP
4) A Television with an IP Set Top Box
Taking Control of that LCD screen!

Fast-moving wildfires in southern California destroyed several homes Sunday, killed one person in San Diego County and closed the Pacific Coast Highway at Malibu.

CNN Headline News

Johnson bests Gordon

Jimmie Johnson made the pass he didn't allow Jeff Gordon to make in the spring, sneaking inside Gordon with 44 laps to go Sunday and holding on to win at Martinsville.

TIME

Buy our latest and greatest Nokia N-series Phones for 10% off.
1 year Warranty and Satisfaction Guaranteed,
.. And then yield control back to subscriber to choose ($$$)
TV screen for receiving phone calls
Trends driving IPTV Adoption
The Perfect Storm

1. **Subscribers want more choice & control**
   New generation grew up Computer & Internet savvy
   Connected Life – At Home, At Work, & On the road
   The content that I want – at the time that I want.

2. **Improved codec, access, server, & CPE technology**
   H.264 MPEG-4 AVC codec improvements
   New ADSL2+, VDSL2, FTTx access technologies
   Moore’s law advancements in processing & memory

3. **Greater competition among service providers**
   No longer limited by access – All services over any network
   Traditional markets going away – Voice & Long distance free
IPTV Components

- Conditional Access Servers
- Video On Demand
- Middleware
- Video Servers
- Service Provider
- Network Provider
- Subscriber Home
- IP NGN
- Set Top Box
- Head end
An IPTV Solution is about Interoperability

1. Some IPTV solutions minimize problems by providing pre-integrated proprietary end-to-end solutions
2. However this can lead to vendor lock-in and lock-out of best-of-breed components
Cisco IPTV Headend Products

Video Acquisition
- Titan MK II QPSK Receiver
- Indus MK II Descrambler
- IRD: D9854
- IRD: D9850

Video Encoding
- D9034 SD: MPEG4 SD
- D9054 HDTV: MPEG4 AVC

Video Processing
- DCM: Digital Content Manager

Video Management
- ROSA: Management
- ROSA: Reports
Quiz #2 – Which is the best answer to:

What is better MPEG2 or MPEG4?

1) MPEG4 delivers higher quality than MPEG2

2) MPEG4 is more compression, so it is of less Quality than MPEG2

3) MPEG4 preserves bandwidth compared to MPEG2 of the same Quality

4) MPEG4 is HD, while MPEG2 is SD only
Typical Compression Ratios

1. For Broadcast Video Applications, the following compression ratios are typical:

2. MPEG-2
   - SD: 270Mbps SDI → 3.5 – 5 Mbps MPEG-2 Stream
   - HD: 1.485Gbps SDI-HD → 15 – 20 Mbps MPEG-2 Stream
   Compressed stream is **50 to 100 times smaller**

3. MPEG-4 part 10/H.264/AVC
   - SD: 270Mbps SDI → 1.5 – 2.5 Mbps H.264 Stream
   - HD: 1.485Gbps SDI-HD → 8 – 12 Mbps H.264 Stream
   Compressed stream is **100 to 180 times smaller**
H.264 vs. MPEG-2

1. Performance of H.264 vs. MPEG-2

![Graph comparing PSNR (dB) vs. Bit-rate [kbit/s] for H.264, MPEG-4 part 2, and MPEG-2]
IPTV Headend
D9034 SD H.264 Encoder Video Quality Improvements

- Inverse Telecine Detection
- Pre-filtering using PreSight-Plus
- Better Mode Decision:
  - Improved RD trade-offs
  - Breathing reduction
- Threshold Enhancements

- Enhanced Motion Estimation
- Picture Adaptive Frame/Field Coding
- Enhanced Capped VBR
- New Scene Change Detection
- Better High-Level Rate Control
- Threshold Enhancements
- Improved Qp modulation

- Improved Fades/Cross Fades Coding:
  - Better fade detection
  - Advanced weighted prediction

- Subjective Optimizations for:
  - Improved mode decision
  - QP scaling
  - More sophisticated rate control

- High Profile Features:
  - Intra 8x8
  - 8x8 transform

Operating bit rate is approaching 1.5 Mbps.
1. H.264 MP@L4 (MPEG-4)encoder
   Best in class AVC encoding!!
2. Worlds first single slice AVC HD encoder
   –“A no compromise encoder”
3. Integrated Picture in Picture (Option)
4. Integrated HE-AAC audio
Single-Slice Coding Demonstration

SA D9054 Single Slice

Six Slices
IPTV Headend
Planned HD Video Quality Improvements

- Enhanced B-picture coding:
  - Direct mode support
  - Implicit weighted prediction

- Better Mode Decision:
  - Improved RD trade-offs
  - Breathing reduction

- Threshold Enhancements

- Picture Adaptive Frame/Field Coding

- Inverse Telecine Detection

- High Profile Features:
  - Intra 8x8
  - 8x8 transform

- Better Low-Level Rate Control through Edge Detection

- Enhanced Motion Estimation through increased effective search regions and multiple reference frames

- Enhanced Capped VBR

- New Scene Change Detection

- Better High-Level Rate Control through more Flexible GOPs

- Pre-filtering suite

- Improved Fades/Cross Fades Coding:
  - Better fade detection
  - Advanced weighted prediction

- Subjective Optimizations for:
  - More effective motion estimation
  - Improved mode decision
  - QP scaling
  - More sophisticated rate control

Bit rate is approaching 6 Mbps!
IPTV Headend
Digital Content Manager (DCM)

“Next generation high density MPEG video processing platform for acquiring, manipulating, and packaging digital video content”

Addressing multiple markets & architectures
- Cable, broadcast, IPTV, on-demand and switched applications
- Fit for use in both centralized and distributed architectures

Benefits
- Best-in-class transrating to deliver more programs over less bandwidth
- Generate new revenues with ad insertion
- Secure content with DVB Simulcrypt scrambling
- Increased up-time with one to one and service redundancy

Future Proof Your Network
- Modular Platform
- Extreme Multiplexing and Transrating Capacity
- Supports up to 350 SD Channels and/or 80 HD Channels
Telco IPTV Network Hierarchy
Hierarchical for scale and to optimize costs

SHE
Super Head End

VHO
Video Headend Office
VOD Servers
Local Content
National Backbone Network

VSO
Video Serving Office
Video Caches
Local Zone Ad-Insertion
Metro Networks

Home
Subscriber
Access Networks
RG

National Content
1-2 sites
10-100 sites
100-1000 sites
1+ Million sites
Video On Demand
What is VOD?

VOD = Video-On-Demand

VOD is about putting the consumer in control in accessing high-quality video-based content.
The Many Forms of Video-On-Demand

1. Movies-on-Demand (MOD)
2. Subscription Video-on-Demand (SVOD)
3. Free Video-On-Demand (FVOD)
4. HDTV-on-Demand (HDVOD)
5. Network-based Personal Video Recording (nPVR)
6. Public, Educational & Governmental On-Demand (PEG-OD)
   - City council meetings, Information
   - Local sports & Community events
7. Distance Learning (EduVOD)
   - Education-on-Demand
   - Do-it-yourself tutorials
8. Advanced Advertising
9. Interactive TV (iTV)
   - Video-based shopping
Subscription Video-on-Demand (SVOD)

Fixed monthly charge for unlimited access to a library of content
Premium Channel (ex. HBO & Starz) SVOD packages with subscription
New distribution outlet for broadcast and cable network content
SVOD is popular driving VOD peak utilizations higher
Average viewing durations much less than 2 hours
Network Personal Video Recorder (nPVR)

1. Broadcast TV whenever you want it
   One copy of all broadcast content captured and stored on a central headend VOD server
   Access to broadcast programs via familiar EPG or searching via category, series, episode, actor, etc.

2. Without cost or complexity of home PVRs
   Works with standard digital Set Top Boxes (STBs)
   Don’t have to guess what you might want to watch
   Don’t have to manage limited PVR disk storage

3. Headend is most cost-effective place to store broadcasts
   Much more reliable and less expensive place to store content
   Headend servers can ensure commercials aren’t skipped

4. Best solution will be a hybrid of STB & network PVR
   STB-PVR handles pausing live TV, nPVR enables unlimited content

Examples:
Time Warner Start Over & Cablevision RS-DVR
1. “The network is the server”
   Internet-proven approach
2. Distributed architecture
   Hierarchical network storage
   Streaming at the network edge
   Multi level cache
3. Two main components
   **Vault Arrays:**
   Ingest & reliable storage for a metro, region or nation
   **Streamer Arrays:**
   “Personalized” video streaming
   Pulls content from Vault on demand and caches at network edge: >95% cache hit rate
   Many Streamer Arrays served by single Vault

Most scalable + Highest availability @ Lowest cost!
Quiz #3 – Which is the best answer to:

Who has the highest market share in IP Set Top Boxes?

1) Cisco
2) Amino
3) Motrolla
4) Humax
Extensive family of IP-STBs
Delivering the subscriber experience

- Single SD or HD plus PIP decode
- Fanless DVR (80 GB typical)
- Whole house server

- One set-top for the entire home (3 decoders-in-one)
- HD to primary TV
- Two SD/RF outputs to other TVs
- Fanless DVR (80 GB typical)

Models with DVB & SCART I/F also available for Middle East
Integrated IP-over-coax = no new wires!

- HPNA3 operates over coax or twisted pair
- Working closely with operators on HPNA3 adapters for IPTV deployments now
The Middleware
What is IPTV Middleware?

1) Firmware that runs inside an IP-STB
2) The Management Software of the Head End
3) The Server that stream the content to the STB's
4) Software that ties all the pieces of an end-to-end IPTV System together
Role of IPTV Middleware: The Enabler, The Glue

1. Enables
   - Revenue producing IPTV services
   - Differentiation for service provider
   - Consistent & extensible consumer experience
   - Linkage of rich media with consumer
   - Compelling GUI

2. Glues
   - Implements the interoperability of systems components
   - Ties together all the parts of the end-to-end IPTV System including:
     - EPG: Content Navigation
     - CAS/DRM: VOD Servers
     - EAS: STB support
     - Billing: Triple play integration
     - SI & SAM: Service Packaging
     - Head end processing
     - Asset Management
     - Business Management
     - Subscriber Management
     - Network Management
Key attributes of Successful Middleware

1. ROBUST
2. COMPELLING
3. FLEXIBLE

Drives Service Provider Success

Customer Experience
1. ROBUST
2. COMPELLING
3. FLEXIBLE

Interoperability
1. OPEN
2. INTEGRATED
3. PORTABLE

Operational Requirements
- SCALABLE
- AGILE
- MANAGEABLE
- UPGRADABLE
- COST EFFECTIVE
Cisco ISDP

1. Presentation and control of digital TV

Compact, highly optimized and reliable
Increased power in a small footprint
Highly dynamic solutions

The latest Internet and TV standards
HTML 4.01, XHTML, DHTML, DVB-HTML
CSS 2.1, CSS TV, CSS 3
DOM 2, JavaScript 1.5, SSL 2 and 3

Full control over style
Easy branding and theme changes
Quickly change Style sheet for new look on demand
Instant branding opportunity

Single solution for all aspects of the UI
Local displays including device set-up menus
Interactive services incl. EPG, VOD, games & news
Minerva Networks iTVManager

Electronic Program Guide (EPG)
1. Access up to 2+ weeks of program info
2. Fast scrolling for large channel lineups
3. Convenience features such as favorites, reminders, auto tune, search, etc.

Video on Demand (VOD)
- Search alphabetical, content type, genre,
- Rental duration & pricing set by SP
- Content is delivered as live unicast stream

ITVManager Back-office
1. Complete set of mgmt tools
2. STB/sub management
3. Content acquisition
4. Asset, PPV, xVOD mgmt
5. EPG creation, EAS support
6. T-commerce packages
7. Service pricing, Billing interf
8. Usage reporting, Caller ID

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Q & A