Hybrid Cable – Evolution to IP Video

Nick Fielibert
Agenda

Market Dynamics and Subscriber Experience

- Why IP Video
- NG IP Video Infrastructure
- Evolution of the Home Network
- NG Access Network
- Conclusion
Consumers want Personalization / on-demand services

Massive Growth of Online Video

Video > 90% of consumer IP traffic by 2013

Apple App Store: 3B apps downloaded

Most popular Web Apps are on-demand content

Pay-TV SPs Ambitions

"TV Everywhere"

Consumers want to watch their content when and where they want

New services to maintain ARPU and reduce churn

Full HD, 3-D, Home TP, Games, etc.

"Cool" User Experience: with simplified access to content (3D, gestures, search, recommendations)

Consumers ready to "cut the cord" (mainly Gen Y)

1 billion web-enabled CE devices by 2015

OTT: connected TVs - $3.4B market by 2014

>1.6M US households ready to "cut the cord" (mainly Gen Y)

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# Market Dynamics and Implications

<table>
<thead>
<tr>
<th>Market Trends</th>
<th>Market Impact</th>
<th>Service Impact</th>
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<tbody>
<tr>
<td>New IP-video enabled consumer devices</td>
<td>Device Proliferation</td>
<td>Home and Access Bandwidth Constraints</td>
</tr>
<tr>
<td></td>
<td><strong>15</strong> Billion IP devices by 2015*</td>
<td></td>
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<tr>
<td>Multi-screen video service launches</td>
<td>Traffic Explosion</td>
<td>Transport and CDN Network Scalability</td>
</tr>
<tr>
<td></td>
<td><strong>4x</strong> Increase in IP traffic by 2015*</td>
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<tr>
<td>Accelerating consumption of online video services</td>
<td>Cloud-based Video</td>
<td>Cloud Scalability and Flexibility</td>
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<td></td>
<td><strong>25%</strong> Increase in online video consumption time**</td>
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Implications to the Media Provider Network 2015 by the Numbers

- Consumer video driving changes
- Industry in transition
- Online video is delivered using Cloud technologies
- Internet-type experiences will decide who captures consumer attention

- 81 Exabytes
  Global IP traffic/month *
- 15 Billion
  Connected Devices *
- 62 Gigabytes
  Average Internet Household Traffic per Month *
- 91
  Percentage Share of video in Consumer Traffic *
Consumer Experience
Delivering a ‘Joyful’ Experience

Unified Experience beyond TV
Unified Experience beyond Android & Apple devices
Customized Experience
Content Relevancy
Multi-screen, cloud services
Quality of Experience

Infinite Content Sources
Managed & Unmanaged Networks
Managed & Unmanaged Devices
QoE
Media Delivery Networks need to evolve to match the new demands of Entertainment

**Infrastructure Challenges Across Media Deployments**

**Scale-Constrained Infrastructure**
Can your network and data center scale to handle new web applications?

**Service-Defined Silos**
Do you have different infrastructures for each Media service?

**Time-Intensive Deployments**
How long does it take you to rollout a new service or consumer app?

**Mission-Critical Applications**
How confident are you in the quality of your services?
Why IP Video?

- Enable subscribers to access cable programming on their choice of IP video devices, on-net and off-net
- Provide a unified portal to all video content
- Consolidate video service infrastructures and workflows, OPEX savings
- Utilize network resources efficiently for all services
- Keep pace with rapidly changing video technology
- Alignment with cloud architecture to support device ecosystem
- CAPEX requirements for all IP video (over DOCSIS) similar to silo approach with hybrid DVB-C
- Lowers bandwidth requirements in the long run by sharing the data pipe between VBR or ABR video and opportunistic data traffic

Deliver any type of video service to any IP video device via an efficient, cost-effective, all-IP network
Why IP Video Technology Implications

Consumer Experience

- Interactive, multi-screen, “4 Any” experience
- High quality content
- Linear, non-linear video, premium content, choices!
- Common experience across devices and environments
- Applications and widgets (e.g. social networking, information, gaming, etc.)
- Rapid service evolution

Technology Implication

- Cloud video delivery via IP, scalable orchestration layer, session shifting
- Optimized for the consumption screen (RTSP, HTTP, multiprofile delivery), content pushed to the edge (CDN)
- More unicast content. Platform scale. Multicast delivery for linear
- Web/PC-based DRM. Transition scenarios will require support for traditional CA
- IP end-points. Service delivered over managed and/or un-managed networks
- ABR delivery over HTTP
- Open platform, w/ ecosystem of developers for 3rd party services
Cloud DVR
Making DVR Management Simple, Convenient and Intuitive

Remote Scheduling
Forget to schedule the DVR? Avoid DVR disappointment and schedule your DVR on the Go. Anywhere. From Any Device.

Enhanced DVR
Need to step away from the big game? Pause and Resume play when you are ready from Any Screen with Companion Device Services for enhanced services (social, ads) and remote control.

Multi Room DVR
Want to move about the house with your favorite show in tow? Whole Home DVR with Cross-Screen Fling makes it all possible.

Time Shifted TV Services
Interruptions, commitments, distractions. Don’t let them interfere with your entertainment. With Restart and Catch Up your favorite shows accommodate your schedule.

Subscriber Benefits

SP Benefits

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### Next-Gen Video Infrastructure

#### Building Blocks

<table>
<thead>
<tr>
<th>Media Data Center</th>
<th>Content Delivery Network</th>
<th>IP/NGN</th>
<th>NGN Edge</th>
<th>Clients</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Secure Data Center design to deliver video services and apps over a unified computing system</td>
<td>• Ingest and distribute massive content across a national footprint to many end-devices</td>
<td>• Guarantee service delivery across a converged NGN with media aware distribution</td>
<td>• Multiple Access types will support many end-devices and target people, not just homes</td>
<td>• Deliver an immersive experience enabled by open clients</td>
</tr>
</tbody>
</table>

#### System and Content Management

- Reach beyond traditional network boundaries to efficiently manage video content and services. Many delivery options with open clients.

#### Subscriber Apps

- Reach beyond traditional video services; deliver subscriber apps across all devices. SPs define common look and feel across different outlets.
Silo’d architectures, with duplication of management infrastructure
Separate VoD, linear, and internet video services with tightly coupled command and control
Hardware-intensive MPEG-level processing
Centralized on-demand video (limited scale)
Infrastructure: MDC, CDN and IP NGN
From a Traditional HE to a Media DC

- Traditional Data Center architecture with Fewer Devices (“Green”)
- Storage and Streaming Separate
  - Unified Storage for Efficiency (Fiber Channel or Fiber Channel over Ethernet format)
  - Streaming Pushed to the Edge for Scale
- Media PoD of Compute, Storage and Network Resources to Optimize and Virtualize
  - On-demand allocation of processing power to applications & functions (Virtual Machines)
- Purpose built MPEG processing hardware migrates to SW and off-the-shelf hardware *
**Next-Gen Video Infrastructure**

Key Tenets of IP Video Driving the Architecture

- **Built on Web Services Protocols**
  - Cloud Service APIs - Accelerates universal reach and 3rd party innovation;
  - Designed for virtualization

- **Exponential scale for large-scale unicast services**
  - Leveraging caching technologies for efficient distribution
  - Whilst addressing the challenges of large scale concurrency (i.e. Linear)

- **Video intelligence propagates deep into the network edge**
  - Providing media, device, and network awareness

- **Open Client Architecture**
  - Multi-device support – for PCs, gaming consoles, tablets, mobile devices, set-tops, etc. Leveraging the cloud to provide adaptation in concert with network intelligence

- **Services Across Managed and Unmanaged Networks**
  - Common experience no matter where the user connects
  - Design for unmanaged, optimized for managed
  - Adaptive Bit Rate (ABR) is video protocol of choice
**Videoscape Target Architecture**

- **Whole Home Offers**
  - Cloud
  - Media Suite
  - Origination Suite
  - Acquisition Suite
  - Advertising Suite
  - Security Suite

- **Multi-screen Pay-TV Offers**
  - Network
  - Videoscape Distribution Suite (VDS)

- **SaaS Offers**
  - Client
  - Videoscape User Experience
  - Videoscape Client Software
  - Managed and Unmanaged Devices

- **Videoscape Conductor**

- **Cisco Prime for Videoscape**
Agenda

Market Dynamics and Subscriber Experience

Why IP Video

NG IP Video Infrastructure

Evolution of the Home Network

NG Access Network

Conclusion
Evolution of the Home Network
Legacy Solution

Cloud

Cable STB

MPEG-TS
Evolution of the Home Network

Hybrid Solution

Hybrid STB + RGW

Cloud

MPEG-TS

IP Video (RTP/HTTP)

Unicast

IP Video (RTP/HTTP)

Unicast
Evolution of the Home Network

Traditional IPTV Solution

Cloud

Cable Modem / RGW

IP Video (RTP/HTTP)

Unicast / Multicast

IP Video (RTP/HTTP)

Unicast / Multicast

Client STB

Client STB

Client STB

PC

Laptop

Tablet & Console

Mobile
Evolution of the Home Network
Future All IP Solution

Only DOCSIS Tuners

Video Gateway

IP Video (RTP/HTTP)
Unicast / Multicast

IP Video (HTTP)
Unicast

Cloud

Client STB

Client STB

Client STB

PC

Laptop

Tablet & Console

Mobile
Market Dynamics and Subscriber Experience

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Evolution of the Home Network

Network Requirements

- Legacy STB
- Hybrid STB
- Client STB
- Video Gateway
- DVB-C QAM
- Docsis QAM
- IP unicast
- Linear VOD Data
- Non Linear
- Linear
- PC/Mac

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Evolution of the Home Network

Network Requirements

Bandwidth Savings by
1. Reducing Analog Linear
2. Reducing DVB-C Linear
3. Migrate to MPEG-4 for DVB-C Linear
Evolution of the Home Network
Future All IP Solution

Video Gateway

Cloud

Client STB

UI Rendering

Content Storage / DVR

Program Guide

VOD Application

Application

Transcode

PC

Laptop

Tablet & Console

Mobile
Evolution of the Access Network
Cisco Video Over DOCSIS Key Features

- **Channel Bonding**
  Fatter pipes enable faster speeds and greater efficiency

- **IP Multicast**
  Shared DOCSIS network is ideal for IP multicast of linear TV services

- **RF Spanning**
  Scalable and cost-efficient solution with broadcast-style delivery

- **IP Statistical Multiplexing with VBR Video**
  Utilize CMTS capabilities to deliver more video streams in less bandwidth

- **Dynamic Bandwidth Sharing**
  Improve bandwidth utilization for all services

- **Admission Control and QoS**
  Reserve DOCSIS bandwidth and ensure video quality

- **Video-aware Cable Modem Load Balancing**
  Support multiple bonding groups per Service Group as IP Video grows
Evolution of the Home Network
VDOC Compared to Classic DVB-C

- IP overlay using DOCSIS is not more expensive than classic DVB-C technology in a triple (Dual)-play scenario
  - Lower CPE cost offsets higher network cost
  - High DS capacity/chassis with new CMTS line card
  - BW efficiency with VBR in shared pipe
  - RF spanning

![Graph showing Total cost per subscriber for different years and technologies (IP overlay, headed GW, DVB VOD)]
CCAP Migration Execution Strategy
Cable MSO Blueprint: Optimize and Monetize Existing Infrastructure

Phase 1 – Reduce OPEX
Phase 2 – Maximize ROI
Phase 3 – Unprecedented Scale
### Meeting CCAP Objectives

With Both Current and Next Generation Products

<table>
<thead>
<tr>
<th>CCAP Objectives</th>
<th>M-CCAP: uBR10012 + RFGW-10</th>
<th>I-CCAP: NG Edge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increased scalability &amp; capacity</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Reduced cost-per-downstream</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Converged multi-service</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>EPON support</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Rack space per system</td>
<td>35 RU</td>
<td>10 RU</td>
</tr>
<tr>
<td>Downstream capacity per SG</td>
<td>Up to 1Gbps / SG</td>
<td>Above 1Gbps / SG</td>
</tr>
<tr>
<td>Deployment range</td>
<td>1 Gbps – 80 Gbps</td>
<td>40 Gbps – 1.2 Tbps</td>
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In Closing...
Some Key Takeaways

- The destination is agreed, end-end IP Video delivery
  - Embracing the operational and cost benefits it affords in a world of diverse end-point devices and networks

- The starting point is understood
  - The existing system being deployed by the Cable Operator

- It’s now all about the journey
  - Making a series of incremental “no-regrets” investments in:
    - Media Data Center architectures and virtualization (equally applicable to Horizon/Orion)
    - A cloud-based services delivery environment with distributed caching to the home
    - Access evolution and bandwidth strategies leveraging Video over DOCSIS
    - Embracing mobility as it’s network relevance increases, i.e., 4G/LTE
    - Whilst appropriately leveraging the capabilities of the existing installed infrastructure
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