CPE Software for Next-Gen Services

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Agenda

- Service Velocity – The Next Frontier
- Next-Gen CPE Software
- Cisco – Helping Service Providers Achieve Agility
Service Velocity – The Next Frontier
Consumers Own Multiple Video Connected Devices

Total U.S. Connected Devices Forecast (in M), 2012 - 2017

- Desktop/Laptop/Home Media Servers
- Tablets
- TVs/Blu-Ray Players
- Streaming Media Players
- Game Consoles
- Average Connected Devices Per HH

2012: 329 (3.8 + 4.8 + 5.4 + 5.8 + 6 + 6.1)
2013E: 397 (4.8 + 4.8 + 5.4 + 5.8 + 6 + 6.1)
2014F: 452 (5.4 + 5.8 + 6 + 6.1)
2015F: 501 (5.8 + 6 + 6.1)
2016F: 546 (6 + 6.1)
2017F: 585 (6.1)

Sources: SNL-Kagan, 10/2013
Consumers Own Multiple Video Connected Devices

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“The average US home has more screens than cushions in the lounge.”

- Nielsen, Future of TV Advertising conference, Dec 2013

Source: SNL-Kagan, 10/2013
Consumer Devices – Hubs for Multiple Content Sources

Usage of Video Platforms in UK, 2013

- YouTube: 76%
- BBC iPlayer: 59%
- Facebook: 40%
- ITV Player: 31%
- 4oD: 9%

Usage of Video Platforms in France, 2013

- YouTube: 82%
- Facebook: 61%
- Dailymotion: 37%
- M6 Replay: 34%
- My TF1: 28%

Share of Smartphone users
Source: Google, Our Mobile Planet, 2014

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Is Service Provider CPE Becoming the Dinosaur in the Living Room?

Open platforms
- App store, >1M apps
- Multiple releases per year
- Android: core features implemented as apps
- Designed for cloud oriented service implementation

Vs.

Traditionally closed platforms
- Infrequent 'big bang' releases
- Long QA cycles
- Migrating services to new hardware is complex, lengthy process
Service Velocity Ingredients

- Simple software, easy to update and maintain
- Modular, open
- Code less, reuse more
- Cloud-based services coupled with thin-client apps
- Robust two-way network
- APIs for service development and integration
- Common, homogenous systems to allow faster deployments system-wide
- Processes and tools to increase efficiency
- Work practices and culture of innovation
- Management support: agility as a strategic imperative to guide priorities and spending
- Work practices and culture of innovation
- Management support: agility as a strategic imperative to guide priorities and spending
Release early and release often. With 1,000 engineers supporting over 1 billion users, Facebook is releasing code twice daily
- Chris Rossi, Facebook DevOps

Google’s DevOps culture led to a **Culture of Continuous**. Continuous reliability, improvement, & velocity
- Larry Page, Google

Created Simian Army – tools that induce various kinds of failures, or detect abnormal conditions, and test our ability to survive them
- Yury Izrailevsky and Ariel Tseitlin, Netflix Tech Blog

One of the big success factors at Spotify is our **agile engineering culture**.
Engineering teams are autonomous squads
- Henrik Kniberg, Spotify blog
Comcast Case Study

Video Subscribers Gained/Lost (thousands)

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“The cloud is a game changer… we’ve had 1,200 updates [on the X1 platform] in the last 12 months”

“Our focus on the customer experience continues to drive our success as we deliver the most innovative products in the industry…”

– Brian L. Roberts, Chairman & CEO, Comcast

2 quarters of video subscriber gains after 26 consecutive quarters of loss
Agile & Continuous Development

- GOAL: More frequent, high-quality releases with constantly evolving advanced feature set.
- Multiple scrum teams with Product Owners and Scrummasters
- Supported by:
  - Engineering management
  - Architects
  - Program management
  - Product management
  - Continuous integration team
- This Journey to Agility involves: Integrators, Suppliers, and Service Providers and requires an evolving partnership model
Next-Gen CPE Software
### Consumer Premise

<table>
<thead>
<tr>
<th>Feature</th>
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<tbody>
<tr>
<td>Services in Client</td>
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<tr>
<td>Increase HDD Storage</td>
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<tr>
<td>Increase Video Tuners for QAM video</td>
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<tr>
<td>Fault tolerant client</td>
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<td>Monolithic Client Updates</td>
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<td>Gateway Transcode/Transcrypt</td>
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<td>In-home Video Consumption</td>
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<td>Discrete Components</td>
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### Cloud

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<tr>
<td>Cloud/Web Services with Open APIs</td>
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<tr>
<td>Scalable Cloud Storage: cDVR, TSTV</td>
</tr>
<tr>
<td>Increase Data Bandwidth for IP video</td>
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<tr>
<td>Robust two-way Network</td>
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<tr>
<td>Frequent Cloud Updates</td>
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<tr>
<td>Cloud-based ABR IP Video</td>
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<tr>
<td>Distributed Apps</td>
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<tr>
<td>Video Everywhere</td>
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<tr>
<td>Connected Life/IoT</td>
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Service Provider Transformation: What Does ‘Next-Gen’ Mean?

**Consumer Premise**

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[Cloud Services]

[Virtual Appliances]

[Cloud Software]
Services on Client and Cloud

- Graphics rendering
- Media Player
- Local record
- Parental Control
- Power Management
- Device Management
- Security
- Tuner Management
- Application Server
- Catalog Management
- Channel Map
- Disk Space Management
- Planner Management
- Record Management
- Cloud Record
- Home Network Topology
- User Profile and Provisioning

Where Implementation Resides
# Additional Design Principles for Next-Gen CPE Software

## Design for security up front
- Modern CPE software interfaces with multiple external and subscriber generated sources – increased attack threat
- Security must be a primary consideration in software design, not an afterthought

## Use open source
- Increases stability and reduces new code efforts
- But don’t forget to test – unit testing, software integration and system integration testing are all key

## Modular and open design
- Allow modification and enhancement by third-parties through applications and extensions
- Maximize functionality in apps; minimize platform-level changes
Cisco – Helping Service Providers Achieve Agility
Cisco Video Client Software Platforms

Cisco software solutions on RDK
Designed for cloud-oriented video platform

Cisco market-leading software
Designed for broadcast and hybrid video platforms
The RDK Is…

- Linux distribution for Service Provider CPE
- Designed to re-use the same open-source software components as COAM (customer owned-and-managed) devices
- "Anti-middleware"
- Designed to support the rapid development and deployment of next generation features
- Built on open source, "community" source, and commercial software components
- Widely supported by SoC vendors on new chipsets
- Well on its way to becoming an industry standard

The RDK Is NOT…

- An end-to-end solution – Provides client components only. Excludes Platform components
- "Open source" – Licensed components may not be distributed in source form
- Hardened for general use (yet) – Currently focused on Comcast networks and applications
- Designed for legacy networks – Agility is realized through shift to cloud components
- Designed for legacy STBs – Requires SoC vendor support
Cisco – Active Participant in Standards, Open Source and RDK

- Top 20 Contributor to Linux Kernel
- Initial and continuing contributions to RDK
- Standards Participation
  - Member of over 100 standards bodies
  - Over 1,000 Cisco employees were active contributors to 1,147 working groups
  - 72 leadership roles
Videoscape End-To-End Software Solutions utilizing RDK

**Full-stack** solutions
With all needed software components

Software development and **optimization** services

Advanced **system integration** services

Integration on multiple **hardware** platforms

**End-to-end** video offering, spanning cloud, network and client
Cloud First Software Design

Application / business logic in cloud
Faster updates across devices
Higher level of scalability for new services

Services in client
Diagnostics, reporting, managed by cloud
Cisco multi-application framework for secure services

Platform software modification
As needed for platform-level components
Codecs, browser, home-networking, etc.
Service Velocity with Cloud Based UX

Cloud business logic under the SP control that supports **thin** UX client on multiple devices

Application Server:
- Implements the **Snowflake** Data Model
- Simplifies the **integration** to Videoscape, 3rd Party Services

Modular applications with thin client architecture:
- Provides **common** set of Widget and UI Libraries
- Supports cloud based **Snowflake** UX

Uses standard **HTML5** and WebGL 3D technologies to realize optimal performance
Client Multi-Service/Application Framework

Full **separation** between platform, services and cloud business logic

**Service Oriented Architecture**
- Multi-process platform
- Each service is sandboxed
- Each service knows only its objects

**Module lifecycle** management

**Secured** app environment
- Authentication mechanism (also for APIs)
- Compliant with external standards
3 Firsts For European Operator
Cisco Cloud Fusion Delivers in Just 50 Days

Objective
First IPV6 IPTV Deployment
Live in just 50 Days

Solution
Videoscape Cloud Services
Videoscape Cloud Software
Videoscape Appliances
Cisco IPV6 routing
Cisco Cloud
  Cloud Services used to achieve velocity
  Migrated in-house for long term

Results
1st IPv6 IPTV deployment
1st RDK IPTV deployment
1st Private/Public cloud IPTV deployment

Ovum’s Innovative Service of the Month, May 2014: Hrvatski Telekom’s RDK-based IPTV
Cisco Cloud Powers Winter Olympics 2014
NBC Sports Live & On-demand Content Streaming in Sochi, Russia

Objective
Stream live and on-demand sports content to set-top and other multi-screen clients
Simple, agile, and elastic cloud architecture that supports content streaming and advanced user experiences

Solution
Transcoding aaS
Content Management aaS
Distribution Suite (Origin Server)
Set-tops running RDK & HTML5
Cisco Services

Results
Agility, portability, flexibility and scalability, with much less engineering and prep time

9800 Multi screen Gateway (G8)
Cisco RDK Based Solution Powers MR-DVR
Lower Cap-Ex & Op-Ex solution to capture MR-DVR home

Objectives
- Deploy the best MR-DVR solution in the target market
- Enable Lower CapEx Capture of MR-DVR home
- Simplified Installation, Lower OpEx, Higher CSAT
- Stepping Stone to RDK, ALL-IP and ViDeoscape

Solution
- Cisco HTML User Experience
- WiFi and/or MOCA enabled IP STB
- RDK Based Software Solution

Results
- CES demonstration
- Trials beginning in 2H-2014
Cisco Video Client Software Platforms

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Cisco market-leading software
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Cisco MediaHighway Software
MediaHighway Evolution

At present
Launched by 45+ pay TV service providers
Cumulative 65+ million subscribers

Targeted at service providers looking for:

- Cost effective solution
- Low TTM
- Low customization
- Scalable solution post launch

Product Highlights

- Productized software with defined feature set for multiple profiles
  - Single code base with On/Off Features
  - Quickly build and deploy multiple profiles/packages

- Feature-rich including DVR, VOD, interactive TV, home networking
  - Advanced roadmap including Catch-up & Restart TV, OTT, Android Platform, Cloud DVR

- Integrated on multiple CPE platforms and chipsets

- Part of Videoscape end-to-end solution – packaged as Videoscape Express

- Moving to agile development, a few customers on board
  - Monthly release cycles
Cisco MediaHighway Software
MediaHighway Fusion

At present
Launched by 6 pay TV service providers
Cumulative 15+ million HDPVR subscribers

Targeted at service providers looking for:
✓ High flexibility
✓ Highly customized features
✓ High engagement working model
✓ Openness to BYO (UI, CA/DRM, Browser, Linux Extensions…)

Product Highlights

• Engineered to support latest technologies and requirements for 1-way and unmanaged 2-way networks
  - Intelligent use of available network to deliver video and rich UX
• Advanced agile development methodologies enable customers to enjoy new features rapidly
  - Per month: 30 feature increments, 100 releases, 140,000 automated tests
  - Flexible release strategy defined in partnership with our customers
  - Advanced testing and ‘real world’ performance analysis
• Provided with premium Snowflake UX
• Integrated on multiple CPE platforms and chipsets
• Flexible implementation and 3rd party integration
## MediaHighway – Moving Forward

### Move the business logic from middleware to the applications
- Thinner more stable service based middleware
- Faster application cycle times
- More control to the application

### Adopt web based standards
- HTML5 and web server technologies
- Seamless interaction between the client and the head-end/cloud

### Provide an open platform
- Allow new modules to be easily added or changed
- Established well defined platform API – Videoscape Open API
Other areas of Cisco Investment to Achieve Agility
Innovation in Data Network: Virtual CPE

Benefits:

**Service velocity**
Easier, faster development of new features/functions

**Lower OPEX**
Simpler device at home, simpler network design

**Grouped services**
Enables multiple household services

**Higher scale apps**
Enable apps that requires more CPU/memory

**Extended CPE lifetime**
Longer replacement cycle for the home CPE

Several interested service providers
First POC with Tier 1 Telco starting June 2014
In Summary

- Software life-cycle for Managed CPE/Settops needs to more closely align with COAM devices: Agility and High Velocity driven from the cloud
- “Next-GEN” CPE Applications will increasingly leverage Cloud and two-way networks.
- RDK based CPE platforms emerging. Cisco is “All-In”.
- Cisco RDK and MediaHighway platforms all converging toward usage of Cloud and Virtualize CPE functions.
Thank you.