Mobile Video Optimization and Delivery

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Remember When …..

*Your telephone was just a telephone?*

Phone Company – only game in town

Problem – I must have misdialed, my mistake?

*Our TV was just a TV?*

Cable / IPTV / Satellite – were the main providers

Problem – Change providers

*And now*

My TV is my PC

My Tablet is my TV

And my Phone is my TV Remote
So What Do Mobile Users Want?

**Mobile Network Quality**
- 65% want consistent performance
- 56% want uninterrupted service / dropped calls
- 47% want consistent speed
- 44% want higher speeds for browsing, downloads, movies
- 36% want National Coverage
- 27% want speedy network repairs
- 13% want Global Coverage

**Mobile Video Viewers**
- 10 seconds: 20% of viewers abandon a video that doesn’t hold their attention
- 30 seconds into an online video as many as third of viewers have moved on
- 1 minute 44% have left
- 2 minutes almost 60% have gone

**What Mobile Users Expect**
- 71% of Mobile Users expect data for websites to load as fast on their Mobiles as on their PC’s – Broadband
- 43% of Mobile Users are unlikely to return to a website that loads slowly.

Sources: Cisco, Heavy Reading Yankee Group, Compuware
Mobile Operator Top Concerns

- Addressing Spectrum Scarcity
- Managing Traffic Growth
- Monetizing and Differentiating

Ubiquitous Connectivity
Service Continuity
Service Innovation
Video Exceeds 70% of Mobile Data Traffic by 2016

(Figures in legend refer to traffic share in 2016.)

#CiscoPlusCA
NA Mobile Data Traffic Growth / Apps
Video to reach 71 Percent of Mobile Data Traffic in 2016

(Figures in legend refer to traffic share in 2016.)
Margins per GB decline slower as Traffic growth slows - indicating that price increases that would slow Traffic growth could significantly improve margins

Source November, 2011 Strategy Analytics
Wireless Data Growth Leads to Spectrum Deficit
Consumer Behavior Fragmented

- Video = 71% of all Mobility traffic by 2016
- Netflix = 29% of US downstream peak internet traffic
- Online Video Snacking 11.4 Hour /month
- Discrete Content on Discrete Devices

Broadcasters and Media Going Direct

- New interactive content – Sky Sport TV on iPad / RTL on iPhone and iPad
- Offering wider content choice on-demand
- Pressure to adapt content for multiple screens and cost-efficient delivery

Business Models Diverging

- CE companies pursuing IP Video
- 10B Mobile devices projected by 2016
- Building application and content eco-systems
- New Streaming Services from non-Traditional Players

Service Providers Colliding

- Multiple-screen offering becoming table stakes
- Rising CAPEX to support OTT Video, limited revenue upside
- Partnerships and Vertical Integration

Online Video Snacking = 11.4 Hour /month

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Discrete Content on Discrete Devices

New interactive content – Sky Sport TV on iPad / RTL on iPhone and iPad

Offering wider content choice on-demand

Pressure to adapt content for multiple screens and cost-efficient delivery

New Streaming Services from non-Traditional Players

Cisco Confidential
<table>
<thead>
<tr>
<th></th>
<th>2011</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traffic/month</td>
<td>92 MB</td>
<td>1.2 GB</td>
</tr>
<tr>
<td>Video Clips</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>Videos</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>Video calls</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Audio tracks</td>
<td>5</td>
<td>50</td>
</tr>
<tr>
<td>App Downloads</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

By 2016, **60 percent** of mobile users (3 billion people) will belong to the **Gigabyte Club**, generating more than one gigabyte of mobile data traffic per month.

In 2011, **0.5 percent** of mobile users belonged to the Gigabyte Club.
Congested RAN Sector

High # of poor quality videos
Congested RAN Sector
High # of poor quality videos
Activate Policy:
If Social Media > 3GB, Manage Social Media

Cisco Intelligent Mobile Packet Core

- Cisco Policy Provisioning Tool
- Mobility Unified Reporting Analytics (MURAL)
- Cisco SSC (SPR)
- Cisco Content Adaptation Engine (CAE)

Cisco ASR 5000
- SGSN
- GGSN
- PCEF

Cisco IPCF
- PGW
- DPI
- MME

HSS / AAA
- OCS
- OFCS

DPI

Messaging
Voice
Video
Music
Peer-to-Peer
Web Page
Activate Policy:
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Cisco Intelligent Mobile Packet Core

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Cisco ASR 5000
SGSN MME SGW
Cisco IPCF PGW GGSN DPI
PCEF

Content Adaption Engine (CAE)

Messaging Voice Video Music Peer-to-Peer Web Page
Usage per Tier

+ Platinum
+ Video Service
  - Gold
    Voice Services
    Social Media
    Non-carrier VoIP
    Streaming
    Gaming
    email
    Web
    Tunnel

+ Silver

Profiles
Schedule
Immediate

Level 1 Overuse
- Cap Social Media 3Gbps

Level 2 Overuse
- Cap Gaming
- Adjust Video Transcoding
- Apply Level 1

Emergency Services Priority
- Block P2P All

Save as New Profile
Usage per Tier

- Platinum
- Video Service
  - Gold
    - Voice Services
    - Social Media
    - Non-carrier VoIP
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Schedule

Save as New Profile
Mobile Video Optimization
No One Single Solution Is A “Silver Bullet”

- Optimization solutions for Internet web browsing and video streaming
- Policy management solutions to apply policy and charging rules
- Content Delivery Networks (CDNs) to cache and optimize content
- DPI-enabled bandwidth management solutions
- Offloading solutions
- Client-based optimization solutions with software on the mobile device
- Network probes and software analytics for the Radio Access Network (RAN) and the core network
- Protocol analyzers and transport optimization hardware
- Data Aggregation and Analysis

Source: ABI Research 2011
Mobile Video Services
New Revenues from Video Content Partnerships

What’s the Opportunity?
- Forge partnerships with video content providers for high quality internet video streaming experience

What are the Benefits?
- Sell premium video services with partners’ video content services
- Upsell higher Data Tiers to support increased video consumption
- Manage video bandwidth impact

Leverage popularity of select OTT video content for win-win new services revenues
So Which Would You Prefer?

Upgrade quality for $.99?

Quality upgraded
Mobile Policy

“The policy engine is the brains of how you want the network to treat different things at different times. It's essential. “

Tony Melone
CTO of Verizon Communications
March 16, 2011

Source: Fierce Wireless, March 16, 2011
Tiered Plans
Gain New Subscribers & Optimize Bandwidth

What’s the Opportunity?
- Offer plans at varying usage quotas and speed tiers

What are the Benefits?
- Drive ARPU with new pricing
- Attract wider range of users
- Up-sell higher tiers to top users

Users are becoming more data quota aware

Source: 2012 Mobile Life Survey, Light Reading
Tiered Services: Speed Tiers with Video

Gold Tier (Policy)
Up to 1 MBPS
$25/Month

Silver Tier (Policy)
Up to 512 KBPS
$20/Month

Bronze Tier (Policy)
Up to 256 KBPS
$15/Month

Original Video
1.5 MBPS
It’s not Just About Offload: Transforming Experience & Growing Revenues

Wi-Fi as a hotspot technology: a wireline service

Wi-Fi as a mobile offload technology: a cellular network optimization tool

Wi-Fi as a platform for:
- Service innovation
- Revenue growth
- Experience transformation
Mobile Offload & Service Bundling Generate Significant Internal Value

Bundled Wi-Fi

- Bundling Wi-Fi service to another service
- Example: mobile data package, broadband
- Typically free of charge
- Reduced customer churn
- Increased market share for core services through differentiation

Offload mobile data traffic using Wi-Fi

- Serve huge growth in mobile data traffic
- Reduce 3G/4G CapEx and operating costs
- Estimated savings: $3 - $5 /GB
Wi-Fi is an Important User-Driven Trend

80% of the time users are within Wi-Fi coverage

Mostly nomadic use

![Bar chart showing Wi-Fi use by location]

50% of smartphone usage is already on Wi-Fi

![Graph showing Wi-Fi usage over time]

19 out of 20 smartphones support Wi-Fi

Sources: Cisco Visual Networking Index, 2011; Bango Inc., February 2011; North Carolina State University, Cisco IBSG 2011
Ad Supported Video Promotions with Cisco SP Wi-Fi Solution

What’s the Opportunity?
- LBS and Ad Supported Video

What are the Benefits?
- Reduced traffic on 3G / 4G RAN
- Create LBS & Advertising Models

Users are becoming more data quota aware: supply reduce cost options
Optimization Savings Analysis
Medium Sized Operator

• Subscribers
  – Total: 15M growing to 18M+
  – Data: 5M growing to 14M
  – Video: 1.8M growing to 5.3M

• Traffic
  – Total: 1.3M to over 35M TB/mo
  – Video: 0.6M to over 24M TB/mo (67% of data)
  – 150 MB/month per sub

• Network dimensions
  – Models 3G and 4G radios
  – 2000 cell sites (5% growth)
  – 400 pre-aggregation sites
  – 25 aggregation sites
  – “Urban” cell sites (20%) carry 40% traffic with GE backhaul
  – “Non-urban” cell sites carry 60% traffic with T1 backhaul
  – Network transport variable
  – All packet core elements modeled
Video Pacing Analysis
15M Subscriber Network

Cost Saving ($M)

Percentage Traffic Reduction from Video Pacing

- 5%
- 10%
- 15%
- 20%
- 25%

$ Payback for $1 Invested

Savings
Payback
Traffic Packet & Video Optimization

Offload, Video Pacing, Optimization

- Optimized Video reduction potentially 20 - 50%
- Un-optimized Video reduction up to 75%

- Potential reduction of up to 26% in video traffic

- Downlink data reduction potentially 10 – 30%

- Mobile Backhaul

- ASR9k

- MWR2941

- Internet

- Video

- Internet

- Video

- Internet

- Video

- Internet

- Video

- Internet

Why Cisco Optimization?

- Lower radio costs
- Increase network capacity
- Enhance customer experience
- Increase network efficiency
- Reduced latency

Potentials savings of 10% to 50+%*
Input View

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**Operator profile**

- Subscribers (Yr1): model grows this by 5% annually
- % of traffic in dense areas: i.e., in dense areas typically the % traffic is higher than the % of cell sites
- % of cell sites in dense areas
- Cell sites: model grows this by 5% annually
- Ratio of cell sites to pre-aggregation sites
- Aggregation sites - urban
- Aggregation sites - non-urban
- Edge/packet core sites
- IP core sites

**Optimizations**

- Avg % reduction in traffic by applying video optimization: 30%
- Cache hit rate in Mobile Videoscape scenario: 50%

**Other**

- Global discount applied to Cisco GPL: 60%
Sample Outputs

Cum NPV (@12% rate) for Network TCO

Cum NPV (@12% rate) for Savings & Costs
Verizon Introduces New Version of VoD App for Mobile Phones

- VzW Mobile Video – On – Demand
- Customers access more than 250 current, full-episode TV shows from all the major broadcast networks
- Premium video content
- Requires a USD $10 monthly subscription

- A data package is required, and the download and use of Verizon Video incurs data usage and will be billed according to the customer’s data package.

Source: 23 August 2011 Telecompaper Americas, Verizon Wireless Sources
Vodafone Germany Plans Triple Play TV with LTE

**Challenge/Opportunity**
- Current mkt dynamics: EUR500 mill./year in unbundled DSL costs
- Mkt Opportunity: Migrate DSL customers to LTE, incl. TV
- SP Strategic fit: Challenge DT on triple play with new bus. model

**Experience Innovation**
- Service description: LTE-enabled set top box for triple play
- Drivers for end-user adoption: Low cost via cellular
- Risks and sensitivity for service adoption: Availability, experience

**Monetization**
- Monetization: No unbundled costs improves 3-play bus. model
- Market size: Unknown
- Revenue sensitivity: NA
- Cost analysis: LTE bandwidth mgt. for TV packet prioritisation

**Strategic Partnership/Alliance**
- Ecosystem: None
- B2C
- Risk assessment 4I's:
  - Innovation, Internal, Interdependency: Low
  - Integration: High

Unbundled costs paid out to DT every year EUR 500 million

Migrate 4 mill. DSL customers to LTE, with TV
The Mobile Network of Tomorrow
Unified Access - Macro, Pico, Femto, WiFi

Complexity

Access selected by end user or the device itself

Opportunity

Optimal usage of network resource under dynamic conditions for best user experience

- Real time access selection decisions based on location, network load, available connectivity, User service level
- Application and service driven traffic routing
- Inter-access load balancing
- Real time feedback for up to date network conditions
Leveraging the Device for Network Optimization

ANDSF (Access Network Discovery and Selection Function)
- Provides dynamic policy updates and receives data from UE
- Can constructs policies based on user profile, session status and dynamic network updates
- Dynamically pushes policy updates based on network triggers
- Receives data from the device and distributes it accordingly
Cisco Mobile Internet Market Leadership
270+ Operators in More Than 75 Countries

34 LTE Wins; 13 Live Deployments
800+ Million Subscribers Across Mobile Packet Cores
800K Femto Cells Deployed
12M Wi-Fi Access Points
Q&A
Thank You
More information www.cisco.com/go/mobile