The Network in 2015 & Beyond
Opportunities and Challenges for the Service Provider

Doug Webster
Vice President, Service Provider Marketing

March 6, 2014
Cisco Visual Networking Index (VNI)

Cisco® VNI Forecast research is an ongoing initiative to predict global traffic growth. This study focuses on consumer and business mobile data traffic and its key drivers.

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
Global IP Traffic Growth / Top-Line
Global IP Traffic Will Increase 3X from 2012 to 2017

Source: Cisco VNI Global IP Traffic Forecast, 2012–2017

© 2013–2014 Cisco and/or its affiliates. All rights reserved.
Establishing the Zettabyte Era

By 2017, global IP traffic will reach an annual run rate of 1.4 zettabytes per year.

1.4 zettabytes is equal to:

- More than all the traffic across the global networks in the Internet years of 1984-2012 combined
- Nearly one billion DVDs per day for an entire year

What is a zettabyte?

- One trillion gigabytes
- Approximately $10^{21}$ bytes (1,000,000,000,000,000,000,000 bytes)

Source: Cisco VNI Global IP Traffic Forecast, 2012-2017
Global Mobile Data Traffic Growth / Top-Line
Global Mobile Data Traffic will Increase Nearly 11-Fold from 2013–2018

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
By 2018, global mobile data traffic will reach an annual run rate of 190 exabytes per year, up from 18 exabytes in 2013 (nearly 11-fold growth).

190X More than all IP traffic generated in 2000
42 Trillion images (e.g., MMS or Instagram)
4 Trillion video clips (e.g., YouTube)

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013-2018
Trend: Device Growth and Increasing Device Usage
Device Proliferation: Challenges and Opportunities

Global Mobile Users

About 5B mobile users by 2018

Mobile Devices / Connections

> 10B mobile devices/connections by 2018

Mobile Cloud Services

90% of mobile end-user traffic will be cloud-based by 2018

Family/Shared Data Plans

2 devices/connections per mobile user by 2018
Growth of Smart Mobile Devices

* Smart devices are those having advanced computing capabilities with a minimum of 3G connectivity.
Global Connections by Network Type
2G, 3G, and 4G Technology Connection Share

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
## Average Traffic Per Mobile Device Type

<table>
<thead>
<tr>
<th>Device Type</th>
<th>2013 MBs per Month</th>
<th>2018 MBs per Month</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Smartphone</td>
<td>10.8</td>
<td>45</td>
</tr>
<tr>
<td>M2M</td>
<td>61</td>
<td>451</td>
</tr>
<tr>
<td>Wearable</td>
<td>78</td>
<td>345</td>
</tr>
<tr>
<td>Smartphone</td>
<td>529</td>
<td>2,672</td>
</tr>
<tr>
<td>Tablet</td>
<td>1,374</td>
<td>5,609</td>
</tr>
<tr>
<td>Laptop</td>
<td>2,455</td>
<td>5,095</td>
</tr>
</tbody>
</table>

Note: In 2013, 4G Smartphones generated 2 GBs/month and 4G Tablets generated 2.4 GBs/month

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
Opportunity: SP Business Model
Data Tiers, Data Caps, and Shared Data Plans
Top 1 Percent Generated 10 Percent of Traffic in 2013
Remaining 99% Growing Faster than Top 1%

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
Tiered Plans Outnumber Unlimited Plans; Unlimited Plans Continue to Lead in Data Consumption

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
© 2013-2014 Cisco and/or its affiliates. All rights reserved.
Number of Shared Plans Increase
No Impact on Usage

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
AT&T offers $15/mo. discount on service plans with no annual contract on Mobile Share data plans.

Verizon: 46% of postpaid accounts now on Share Everything data plan, 1.6 million new connections.

There is no observable impact on usage, shared plans reduce churn due to group use of plan and common data/texting benefits.
Opportunity: Co-opetition
### OTTPs/Telcos Offer Challenges & Opportunities

<table>
<thead>
<tr>
<th>Challenges</th>
<th>Opportunities</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Google Fiber expanding</td>
<td>- AT&amp;T, Comcast, Verizon make deals with Netflix to improve video streaming</td>
</tr>
<tr>
<td>- Claims to be 100X faster than avg. household BB</td>
<td>- Netflix accounts for ~30% of US Internet traffic during peak hours</td>
</tr>
<tr>
<td>- An entire HD flick can be downloaded in 30 secs</td>
<td>- China Telecom faced slow voice and SMS revenue due to OTT apps like WeChat</td>
</tr>
<tr>
<td></td>
<td>- In 2013, China Telecom has new WeChat offer (SIM card)</td>
</tr>
<tr>
<td></td>
<td>- Sold 1M WeChat SIM cards in first month of offer, grew to 1.64M by JAN 2014</td>
</tr>
<tr>
<td>- Shared goal to connect everyone in the world</td>
<td>- WhatsApp: 450M users monthly - adds &gt;1M/day</td>
</tr>
<tr>
<td>- WhatsApp: 450M users monthly - adds &gt;1M/day</td>
<td>- Free social messaging costs SPs $33B/year</td>
</tr>
<tr>
<td>- Free social messaging costs SPs $33B/year</td>
<td></td>
</tr>
</tbody>
</table>
Smarter Devices Need More Intelligent Networks
SPs Leverage/Monetize Consumer & Business Big Data & Data in Motion

Strength: Customer & Business Intelligence
- Credible customer/business insights
- Focus on social or security applications
- Meaningful relationship with customers
- Enhance brand loyalty
- Be perceived as more than “pipes”
- Monetize rich CRM & ERP data sets
- Reduce churn

Strength: Network Intelligence/Analytics
Opportunity: Internet of Everything (IoE)
WW M2M Connections Grow 6X; 2013–2018
By 2018, >50% of M2M Connections on 3G

WW Connected Wearables Grow 8X; 2013–2018
By 2018, 13% Have Embedded Cell Capability

43% CAGR 2013–2018

52% CAGR 2013–2018
Wearable Device Usage
Day in the Life of Smart Glass (249 MB)–High Usage Scenario

Traffic in MB

<table>
<thead>
<tr>
<th>Activity</th>
<th>Traffic in MB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Video Communication</td>
<td>12</td>
</tr>
<tr>
<td>Navigation</td>
<td>24</td>
</tr>
<tr>
<td>Audio Streaming</td>
<td>91</td>
</tr>
<tr>
<td>Video Upload</td>
<td>121</td>
</tr>
</tbody>
</table>

Based on Single Day of Sample Use
Internet of Everything (IoE) Opportunities

**Beeline M2M Services** – mapping, monitoring, reporting, telemetry targeted at fleet management, oil and gas, point of sale terminal customers;

**Global M2M roaming alliance** with KPN, NTT DoCoMo, Rogers Wireless, SingTel, Telefonica, and Telstra – cohesive global M2M solutions

**Telefónica UK** to **deploy smart meters** in the central and southern regions of Great Britain – over 53m smart meters by 2020; £6.7bn in net benefits to UK through efficiency in management and deployment and reduced energy consumption.

**FiLIP Wearable Smart Locator** with voice is for kids 5-11 years of age. It allows parent and kids to stay connected via calls and text messages. Parents can define safe zones and stay in touch with their kids over smartphone, tablet, or computer.

**Mobile Security and Surveillance** is a video monitoring business service with cloud-based storage and management systems and data analysis. The real-time video streaming offers analysis and intelligent alerts to the customers.
Opportunity: Wi-Fi Monetization
Global Mobile Data Traffic Offload to Wi-Fi/Small Cell
52% of Mobile Traffic to be Offloaded by 2018

Note: Offload refers to traffic from dual mode devices (i.e., supports cell & wi-fi; exc. laptops) over wi-fi/small cell networks

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018

© 2013-2014 Cisco and/or its affiliates. All rights reserved.
Transforming Visitor Experience with Personalized, Managed Wi-Fi

- Seamless Handoff from 3G/4G to Wi-Fi using AT&T WISPr Client or HotSpot 2.0
- Download Fernbank App
- Local Services Discovery on the Device
- Local Services Discovery Application Downloaded
- 3G Personalized Application JESSICA_Personalized Tour Guide
- Hi, I am Jack. I'll be your tour guide today.
- Hear that Roar?
- ROAR
- Context-Based Information based on Visitor Location
- View Note Card
- You are now in the Great Room. See how the Giganotosaurus lived millions of years ago!
- Continue Turn by Turn navigation based on Location
- Please Follow Route to find NatureQuest
- Congratulations Jessica! You are now a Junior Paleontologist!
- A. B. C. Which animal lived in the mighty Red Oak?
- Here are some recommendations from our Gift Shop!
- Get 10% OFF with your QR Code
- • Business Intelligence
- • Promotions
- • Analytics
- • Social Networking
- Share Results
- Here are some recommendations from our Gift Shop!
- Get 10% OFF with your QR Code
MGM Resorts: Personalized Location, Ads
Differentiating the Guest Experience through Wi-Fi Services
Copenhagen Airport
Aid Travelers through Wi-Fi Services

What’s New
• Location Analytics

Security Personnel
Check-In Personnel
Customs Personnel
Traffic Flow
Advertising Placement
Indoor Mall, North American MSO
Enriching the Shopping Experience through Personalization
Highly Targeted Ads Drive CPM Revenues

4 Year Cumulative Revenues from Retail

Source: Cisco and RCBG Wi-Fi Monetization Research (2013)
Opportunity: Video Everywhere
## Top Global Traffic Generating Apps

<table>
<thead>
<tr>
<th>Top Traffic-Generating Mobile Apps (Android)</th>
<th>Top Traffic-Generating WiFi Apps (Android)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Facebook</td>
<td>Netflix</td>
</tr>
<tr>
<td>YouTube</td>
<td>Video Streaming</td>
</tr>
<tr>
<td>Netflix</td>
<td>Instagram</td>
</tr>
<tr>
<td>TubeMate</td>
<td>Video Streaming</td>
</tr>
<tr>
<td>Instagram</td>
<td>Dropbox</td>
</tr>
<tr>
<td>TunelIn</td>
<td>File Sharing</td>
</tr>
<tr>
<td>SoundCloud</td>
<td>Facebook</td>
</tr>
<tr>
<td>Flipboard</td>
<td>Social Media</td>
</tr>
<tr>
<td>Skype</td>
<td>YouTube</td>
</tr>
<tr>
<td>Twitter</td>
<td>Video Streaming</td>
</tr>
<tr>
<td>Dropbox</td>
<td>Flipboard</td>
</tr>
<tr>
<td>Spotify</td>
<td>News</td>
</tr>
<tr>
<td>Pandora</td>
<td>TunelIn</td>
</tr>
<tr>
<td></td>
<td>Audio Streaming</td>
</tr>
<tr>
<td></td>
<td>VLC Media Player</td>
</tr>
<tr>
<td></td>
<td>Video Streaming</td>
</tr>
<tr>
<td></td>
<td>BSPlayer</td>
</tr>
<tr>
<td></td>
<td>Video Streaming</td>
</tr>
<tr>
<td></td>
<td>Spotify</td>
</tr>
<tr>
<td></td>
<td>Audio Streaming</td>
</tr>
<tr>
<td></td>
<td>NYTimes</td>
</tr>
<tr>
<td></td>
<td>News</td>
</tr>
<tr>
<td></td>
<td>Hulu</td>
</tr>
<tr>
<td></td>
<td>Video Streaming</td>
</tr>
<tr>
<td></td>
<td>TubeMate</td>
</tr>
<tr>
<td></td>
<td>Video Streaming</td>
</tr>
</tbody>
</table>

Source: Cisco VNI Global Mobile Data Traffic Forecast, 2013–2018
Innovative Video Services Proliferate

<table>
<thead>
<tr>
<th>Service Providers</th>
<th>Content Providers</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Comcast is extending TV service beyond the home with their XFINITY TV Go app</td>
<td>• BBC iPlayer’s tablet video views (2.2m) exceeded their PC-based views (2.1m) on Dec. 26 2013, and their smartphone viewership is growing fast.</td>
</tr>
<tr>
<td>• Comcast’s TV Everywhere strategy is helping reduce churn, and video subs increased in 4Q13 for the first time in over six years</td>
<td>• Airtel is opening new markets for mobile video by offering premium content for one rupee (USD$0.02) per clip. Mobile TV viewership is up 400% Y/Y.</td>
</tr>
<tr>
<td>• Airtel is opening new markets for mobile video by offering premium content for one rupee (USD$0.02) per clip. Mobile TV viewership is up 400% Y/Y.</td>
<td>• LINE has added video calling and video clip messaging to its popular social messaging platform, video-enabling 350 million users.</td>
</tr>
</tbody>
</table>

Source: Comcast, BBC, Cisco, Airtel Mobitude 2013 Report, Naver, 2014

© 2013-2014 Cisco and/or its affiliates. All rights reserved.
Opportunity & Challenge: This Ecosystem
The Cycle: Virtuous or Vicious? (CTM, March 2012)
Thank you.