Network usage optimization and service monetization through IP traffic management
Telco Service Provider challenges for optimal usage and service monetization
Application type and users’ pressure on network


<table>
<thead>
<tr>
<th>Consumer Internet Traffic, 2011–2016</th>
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<tr>
<td><strong>2011</strong></td>
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<tr>
<td><strong>By Network (PB per Month)</strong></td>
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<tr>
<td>Fixed</td>
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<tr>
<td>Mobile</td>
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<tr>
<td><strong>By Subsegment (PB per Month)</strong></td>
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<tr>
<td>File sharing</td>
</tr>
<tr>
<td>Internet video</td>
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<tr>
<td>Web, email, and data</td>
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<tr>
<td>Online gaming</td>
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<tr>
<td>Voice over IP (VoIP)</td>
</tr>
<tr>
<td><strong>By Geography (PB per Month)</strong></td>
</tr>
<tr>
<td>North America</td>
</tr>
<tr>
<td>Western Europe</td>
</tr>
<tr>
<td>Asia Pacific</td>
</tr>
<tr>
<td>Latin America</td>
</tr>
<tr>
<td>Central and Eastern Europe</td>
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<tr>
<td>Middle East and Africa</td>
</tr>
<tr>
<td><strong>Total (PB per Month)</strong></td>
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<tr>
<td>Consumer Internet traffic</td>
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Source: Cisco VNI, 2012
OTT traffic pressure on SP derived profit

OTT traffic is a clear threat to SPs, that erodes their margins (?)

- Users expect quality content delivery: no delays, buffering, terminated sessions
- Users incrementally consume SP resources, without incremental revenue contribution
- SPs have to make continuous upgrades
- Usually, Content Providers (not SPs) make revenue out of:
  - Content
  - Advertising
  - Customer (behavior) data
OTT traffic - threat or opportunity?

How can the SP avoid:

- being simple **transport** provider, like a Post Office that delivers unlimited number of letters of all types, for a fixed monthly amount
- significant upgrade investments without clear benefit
- continuous profit decrease

OTT traffic is clear **opportunity**, if the SP:

- uses existing network assets and customer relationships +
- introduces intelligent solutions for traffic management and media caching,

**AND THEREBY**

- optimizes network usage and enters the OTT value chain
Solutions that fit SP objectives

**CAPEX and OPEX REDUCTIONS**

Solutions that enable:

- Deep knowledge of Internet users’ applications, traffic and protocols
- Right network sizing, deferred IP infrastructure investments
- Bandwidth savings on International and National Internet links

**REVENUE and ARPU INCREASE**

Solutions that enable:

- Improved QoE for Internet users: Churn decrease, Higher-class Internet packages migration, New customers acquisition
- OTT traffic monetization
Cisco DPI Technology
Service Control Engine (SCE)
Cisco DPI Technology

- Determine **application** rather than just ports it is using.
- Mechanisms to influence and **control** traffic
- Reference users by IDs, not just by IP address
- Full and comprehensive reports about **anything** possible

<image of diagram>
Cisco DPI Technology

Adds a layer of service intelligence and control features which enable a Service Provider to evolve into Experience Provider:

- Understanding of who subscribers are
- What services are they using
- Differentiate between services at the application level
- Prioritize application traffic by subscriber
- Meter and charge for services per subscriber
- Enable zero-touch provisioning, for full self-service account setup
- Enable customers to self-select and modify services and features
Implementation Architectures
Network Positioning – Specific Scenarios

1. DPI positioned between the aggregator (BRAS, ISG, MPLS PE) and the NW Core
2. DPI Cascade in order to provide link and device redundancy
3. Centralized deployment: make a DPI farm in a MGSCP topology using Cisco ECLB to load balance the traffic over several DPI devices
Scalable Deployment: Multi-10-Gbit Solution

- Cisco 6500/7600/ASR9k used as dispatcher
- ECLB used for equal Traffic Distribution between boxes
- N+M Redundancy provided by LACP (typically N+1)
- Up to 8 active members in an ECLB bundle on a 6500/7600
Putting the puzzle together
Phased Deployment (Functionality Layers)

1. **Infrastructure Resources Usage Analysis**
   - Objectives:
     - Monitor traffic distribution
     - Usage patterns
   - Traffic Topology
     - Receive Only

2. **Global Traffic Optimization**
   - Objectives:
     - Improve Network Experience
     - Reduce Operational Expense
   - Traffic Topology
     - Active Mode

3. **Differentiated Subscriber Policies**
   - Objectives:
     - Service creation
     - Subscriber Differentiation
     - Billing and Value Added Services
   - Traffic Topology
     - Integrated Into Back Office (AAA, billing, policy server)
Phase 1. Infrastructure Resources Usage Analysis
SCE Application Classification Capabilities

- Protocol Coverage – more than 600 Protocols
- Application Groups: Voice, Video, Gaming, File-Hosting, IM, P2P, Web-based services, etc.
- Zero Day Classification – Behavioral/Heuristics Algorithms
- Custom Signatures
- Support for classification modifiers (URL, Calling/Called Number, etc...)
Usage Analysis - Real Life Example

Question: How much **video** and **P2P** traffic is passing through my links?
Question: How much **video** and **P2P** traffic is passing through my links?

DPI Answer:
Question: Can I see what are the most popular P2P applications?
DPI Answer:
Usage Analysis - Real Life Example

Question: How many Skype and Viber calls are established via my network?

DPI Answer:
Phase 2. Global Traffic Optimization
EasyApp – Fair Usage Policies

1. **Basic level**, the Cisco SCE platform manages traffic by distributing available bandwidth equally between subscribers.

2. **Transient Subscriber quotas** – Example: grant high-priority to the first 10 MB of traffic a subscriber consumes each hour.

3. **Subscriber Usage Quotas** - Cisco SCE in conjunction with a policy server to keep track of usage on a longer term (typically monthly periods) to implement usage-based service plans

   - **E.g.**
     - Lowering the priority of user’s traffic if they consume more than 500 GB per month
     - Creating a billing record for every 1 GB or excess traffic above 400 GB per month
EasyApp – Time Shifting

Typical SP traffic mix:
- Interactive apps – gaming, video
- Non-interactive - P2P, backup
EasyApp – Time Shifting Real Life Example

Increased **QoE** for interactive apps during peak-hours.

<table>
<thead>
<tr>
<th>Dataset</th>
<th>Minimum</th>
<th>Average</th>
<th>Maximum</th>
<th>Last</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Encrypted Bittorrent</td>
<td>627</td>
<td>1356</td>
<td>3314</td>
<td>796</td>
</tr>
<tr>
<td>Encrypted Bittorrent</td>
<td>28</td>
<td>69</td>
<td>133</td>
<td>48</td>
</tr>
<tr>
<td>Total</td>
<td>28</td>
<td>713</td>
<td>3314</td>
<td></td>
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Adding more elements - Caching

- **P2P Caching**: Fast P2P download all the time
- **Video Caching**: Fast download of popular videos
- **Superior QoE**
- **Reduced network load**
- **OTT Monetization**
DPI and Caching
Network Positioning

- Works together with DPI
- Out-of-band
- 1:N Redundancy
- Simple Network Integration
- Scalability, Low Footprint

![Network Diagram](image-url)
Media and P2P Caching – OTT Monetization

- Screen Continuity
- Tiered Service Control
Phase 3. Getting personal:
Per Subscriber Differentiated Policies
Full Subscriber Awareness

- Subscriber Manager
- Quantum Policy Server
- ISG
- SCE positioned close to the Aggregation Device
Quantum Policy Server

- Policy enforcement point in the network
- Southbound interface to PSM elements ISG and DPI
- Northbound interface to OSS/BSS
- Point of network/application policy creation
Nights and Weekends

**Encourage usage of off-peak hour data to utilize excess capacity**

- Offer favorable rates to shift usage to “nights and weekends”
- Apply higher rates or bandwidth caps at peak times
- Restrict/Open P2P usage during peak/off-peak hours
- Offer lower rate, “Happy Hour” periods

The Quantum Policy Server applies policy based on time criteria (e.g. time of day, day of week, etc.)

Sets rule activation/deactivation time to control policy at the application layer without requiring messaging at ToD boundaries.
Usage Metering by Application

Prevent Bill Shock and Provide Subscriber Self-Management

- View Current Usage
- User-Defined Thresholds
- Top-Up Account
Pay Per Use

Encourage extra data usage by simplifying payment and service once quota is breached

- Allows customer to exceed their data quota without needing to top-up
- When quota is exceeded:
  - No throttling back
  - Customer recharged on a per volume/KB rate
Tiered Services

Differentiated by:

- **Bandwidth**
  - Raw pipe performance

- **Applications**
  - Different application mix

Basic Plan
- Includes basic OTT service access to Email and the WWW

Plus Plan
- Includes Basic Plan and Facebook for free or at reduced rate

Premium Plan
- Includes Plus Plan and P2P, Skype Video, VoD, and Internet-Web TV

- **Real-time offers**
  - Bandwidth on demand etc
3RD Party Sponsored Services

Service provider acts as intermediary between subscriber and content provider (Over The Top)

- 3rd party’s content is not charged against subscriber’s quota
- content may be prioritized
- Service provider is compensated by 3rd party for content distribution
Shared Multi-Device, Multi-Access Quota Sharing

- Single Quota Bucket
- Per-Device Usage and Thresholds
- Portal-Based Top-Up
- FMC Shared Quota (Mobile, Fixed, WiFi)
Thank you for your attention