Localization based Peer2Peer traffic optimization

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BellLabs
Market Trends – Traffic “The Exabyte Age”

- Network traffic is growing exponentially
- Adding capacity is not a sustainable situation
- Optimizing the use of network resources is required!
- File sizes are huge (e.g., HD movies)

- P2P traffic volume will more than triple by 2012
- HTTP is growing at a faster rate

Network traffic is growing exponentially.

Adding capacity is not a sustainable situation.

Optimizing the use of network resources is required!

File sizes are huge (e.g., HD movies).

P2P traffic volume will more than triple by 2012.

HTTP is growing at a faster rate.

Source: Cisco, Global IP Traffic Forecast and Methodology, 2006 - 2012

* Source IDC
P2P Traffic Optimization: The problem

The Problem

External
75-90%

Internal
10-20%

P2P = 40-60% of Total Transit
IP addresses involved in Bittorrent in Poland - Jan 2010

Biggest Polish Telco and their IP addresses involvement in Bittorrent
Existing Options for Managing P2P

- **Throttling**
  - Limits Ongoing P2P Activity
  - **BUT:**
    - More than 60% of P2P Users Pay for Premium Packages
    - 89% Of P2P Users Do Not Want Throttling
    - 60% Say They Would Walk Away if Implemented
    - Very High CapEx Costs ...
    - Must be Scaled with Traffic

- **P2P Caching**
  - Provides Copies of Downloadable Content Within Local Network
  - **BUT:**
    - Increases P2P Activity
    - Replaces Bandwidth Costs by Server Costs
    - High CapEx & OpEx Costs ...
    - Must be Scaled with Traffic

Kalix Focus Group Research Dec 2009
Localization based P2P Traffic Optimization

- Promotes efficient P2P traffic flows
- Innovative P2P localization algorithms from Bell Labs
- Optimizes P2P traffic instead of suppressing it (not DPI or caching)
- Small / scalable network footprint
- Sold as a service

Service gives operator the flexibility to guide traffic

- Local within the network regions
- Away from transit links
- Utilize peering links
- Avoid costly intra-network links

Positive experience for end-users
Localization based P2P Traffic Optimization: Industry

Before: Random Peer Selection

After: “Optimized” Peer Selection

Industry Direction - IETF ALTO & P4P

External

Internal

Peering Partners

Transit

External

Internal

Metros
AppGlide:
Localization based P2P Traffic Optimization: solution

After Optimization

40-60% reduction in P2P transit

No change in end user experience (upload & download the same)
Technology Components

- **Scout**
  - Gathers P2P meta info
  - Builds map of network topologies and P2P activity

- **Base/AppGlide portal (UI)**
  - Management, reporting, configuration
  - ISP-wide P2P traffic management

- **Agent**
  - Transparent tracker proxy for P2P signaling
  - P2P localization algorithm
  - Secure reporting/configuration interface to hosted Base
Typical P2P Flow Today

1. Search content
   - P2P Web site and search engine
   - Web server

2. Download torrent file
   - Tracker domain name or IP@
   - .torrent file

3. Request Peer list for file X from tracker
   - Internet tracker
   - Peer IP@s list

4. International data exchange
   - Routing core

Internet tracker
- IP@ & port#
- Peer IP@s list
- Aggregation
AppGlide
Alcatel-Lucent P2P Traffic Optimization scenario

- Agent inserts itself into swarm signaling via policy-based routing
- Agent proxies P2P signaling to Internet tracker

1. Request file X
2. Proxy request to Internet tracker
3. Manage IP peerlist
4. Exchange content locally
P2P Localization Uses Topology Information

- Keeps P2P traffic local, reducing traffic on transit links
- Favor peering SLA over transit SLA

### Network partitions

<table>
<thead>
<tr>
<th>Name</th>
<th>IP ranges (subnets)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PID 1</td>
<td>North: X.X.X.X /12</td>
</tr>
<tr>
<td>PID 2</td>
<td>South: Y.Y.Y.Y /13</td>
</tr>
<tr>
<td>PID 3</td>
<td>East: Z.Z.Z.Z /12</td>
</tr>
<tr>
<td>PID 4</td>
<td>West: W.W.W.W /12</td>
</tr>
<tr>
<td>PID 5</td>
<td>Peering: AS =&gt; IP ranges</td>
</tr>
<tr>
<td>PID 6</td>
<td>Transit: Others</td>
</tr>
</tbody>
</table>

### Topology weight matrix

<table>
<thead>
<tr>
<th>FROM</th>
<th>TO</th>
<th>Local</th>
<th>Peering</th>
<th>Transit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>This-ISP</td>
<td>SLA</td>
<td>SLA</td>
<td>SLA</td>
</tr>
<tr>
<td>IP-range 1</td>
<td>IP-range 2</td>
<td>IP-range 3</td>
<td>ISP-A</td>
<td>ISP-B</td>
</tr>
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<td>5</td>
<td>8</td>
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<tr>
<td>3</td>
<td>3</td>
<td>0</td>
<td>7</td>
<td>10</td>
</tr>
</tbody>
</table>

Using cidr, asn
**AppGlide:**
*Alcatel-Lucent P2P Network Audit service - Benefits*

A comprehensive view of an ISP’s P2P traffic and various P2P file sizes

A unique and detailed traffic analysis of P2P activity in a provider’s actual network (including swarm sizes, content popularity, protocol usage)

Peer-to-peer traffic crosses all network layers

Transit traffic decreases by 58%

A personalized savings analysis

A personalized traffic analysis model to show potential network efficiencies when the Alcatel-Lucent optimization service is deployed
AppGlide - Customer Validation

**End-User Reactions:**

“Makes sense to me”

“Perfectly reasonable solution for customers provided it is communicated”

“OK - seems sensible to me”

**Focus Group Reactions:**

*Kalix Focus Group Research Dec 2009*

*More than 90% of users support P2P optimization*

“... as long as I get what I want when I want it, I’m cool”

“I don’t care where it comes from as long as I get it”

“If my QoE is maintained and at the same time the operator can save some money, I don’t have an issue with it”

“I see localization as a natural way to handle P2P”

**Consumer Advocates Reaction:**

I think each technology has its place in the network. But localization the way you explained should work.

We like the way you use outside peers in your solution
Thank You