TSV P2P Efforts – From an ISP’s Perspective

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Presentation Overview

• Current application traffic levels
• Unique P2P traffic impacts for ISPs
• TSV WG Efforts for P2P Efficiency
  – ALTO, DECADE, LEDBAT, PPSP
• Benefits of localization and P2P caching
## Composition of Network Traffic North America Peak (Sandvine 2010)

<table>
<thead>
<tr>
<th>Traffic Class</th>
<th>Upstream</th>
<th>Downstream</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time Entertainment</td>
<td>16.3%</td>
<td>45.7%</td>
</tr>
<tr>
<td>Web Surfing</td>
<td>11.0%</td>
<td>24.3%</td>
</tr>
<tr>
<td>P2P File Sharing</td>
<td>53.3%</td>
<td>13.2%</td>
</tr>
<tr>
<td>Real-time Communications</td>
<td>5.5%</td>
<td>N/A</td>
</tr>
<tr>
<td>Social Networking</td>
<td>N/A</td>
<td>2.4%</td>
</tr>
<tr>
<td>Gaming</td>
<td>N/A</td>
<td>2.4%</td>
</tr>
</tbody>
</table>
## Evolution in Aggregate Traffic North America Peak (Sandvine 2011)

<table>
<thead>
<tr>
<th>Traffic Class</th>
<th>2009</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Real-time Entertainment</td>
<td>29.5%</td>
<td>49.2%</td>
</tr>
<tr>
<td>Web Surfing</td>
<td>38.7%</td>
<td>16.6%</td>
</tr>
<tr>
<td>P2P File Sharing</td>
<td>15.1%</td>
<td>18.8%</td>
</tr>
<tr>
<td>All Other</td>
<td>16.7%</td>
<td>15.4%</td>
</tr>
</tbody>
</table>
P2P Traffic Impacts on the Network

• Use of overlay network topology
  – Often does not reflect physical net topology
  – Less-than-efficient use of net resources

• Symmetric, high throughput traffic
  – Impacts plans for network capacity augmentation
  – May impact design of network equipment
  – May impact physical allocation of capacity, such as wireless/wireline frequencies
Simplified Cable Access Network
Impact of the P2P Overlay
TSV WG Efforts for P2P Efficiency

• ALTO
  – Better initial peer selection for greater swarm localization

• DECADE
  – In-network storage for caching of P2P data

• LEDBAT
  – Congestion control to limit delay impact

• PPSP
  – Enable localization and caching
Benefits of Swarm Localization

• Initial peers are more likely to be located in same ISP network

• Network benefits
  – P2P traffic crosses fewer ISP links
  – ISP may reduce backbone traffic (and backbone interconnect costs)

• Enduser benefits
  – Peers may perceive lower latency, higher network reliability, and higher throughput
Benefits of P2P Caching

• Traffic exchange among peers is directed through network caching server

• Network benefits
  – Peers avoid both duplicate uploads and downloads of data
  – ISP may reduce access & backbone traffic

• Enduser benefits
  – Peers may perceive lower latency, higher swarm reliability, and higher throughput
P2P Overlay Using Network Caching
Economics Behind Network Caching

• Continued growth in overall Internet traffic
  – 45-60% y-o-y growth (Arbor/Cisco/MINTS)
  – Need 33% y-o-y cost reductions to keep up

• Divergence in infrastructure cost reductions
  – 15% y-o-y cost reduction in routing and transport costs
  – 38% y-o-y improvement in price / performance for commodity servers
  – 30% y-o-y improvement in storage density

• This is still a work in progress!
TSV P2P WG Efforts Represent a Promising Industry Direction

• Pro-active traffic management
  – Versus reactive traffic management

• Applications leverage network information and resources
  – Versus unilateral actions by either the network or enduser applications

• Win-win traffic optimizations
  – Versus zero-sum tradeoffs among stakeholders