P4P: Towards More Productive ISP/P2P Interaction

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ICNP 2008 Panel
Observation

- Different ISPs may have different opinions on P2P
  - some ISPs are happy with P2P
  - some ISPs are unhappy with P2P
    - illegal content, potential competitor
    - high traffic volume
Different ISPs feel the “pain” of high P2P traffic volume differently

- at the edge
- at the backbone
- at the interdomain links
A Fundamental Problem in Internet Architecture

- No effective communication channels between ISPs and P2P applications
P4P: Provider Portal for (P2P) Applications

- A framework to enable better cooperation between ISPs and P2P
  - ISPs provide information/capability to P2P
  - P2P provides information/request to ISPs
P4P ISP Information Distribution

- Providers
  - publish information via ISP Portals

- Applications
  - query providers’ Portals to obtain ISP information
  - adjust traffic patterns accordingly
P4P ISP Information Interface Requirements

- Economics/design for tussle
- Extensibility and neutrality
- Scalability
- Privacy preservation
P4P Information Interface

- Interface design is guided by optimization decomposition of joint ISP/P2P optimization

- Two views:
  - ISP (internal) view
  - P2P (external) view
Field Tests: P2P Completion Time (seconds)

<table>
<thead>
<tr>
<th>Improvement %</th>
<th>Native</th>
<th>P4P</th>
<th>Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td>30%</td>
<td>243</td>
<td>192</td>
<td>21%</td>
</tr>
<tr>
<td>50%</td>
<td>421</td>
<td>372</td>
<td>12%</td>
</tr>
<tr>
<td>70%</td>
<td>1254</td>
<td>1036</td>
<td>17%</td>
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<tr>
<td>90%</td>
<td>7187</td>
<td>6606</td>
<td>8%</td>
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<tr>
<td>95%</td>
<td>35046</td>
<td>14093</td>
<td>60%</td>
</tr>
</tbody>
</table>

All P2P clients: P4P improves avg completion time by 23%
FTTH clients: P4P improves avg completion time by 68%

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Field Tests: ISP Perspectives

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# Joint Work in the P4P Working Group

**Core Group**
- AT&T
- Bezeq Intl
- BitTorrent
- Cisco Systems
- Comcast
- Grid Networks
- Joost
- LimeWire
- Manatt
- Oversi
- Pando Networks
- PeerApp
- Solid State
- Telefonica Group

**Observers**
- Abacast
- AHT Intl
- AjauntySlant
- Akamai
- Alcatel Lucent
- CableLabs
- Cablevision
- Comcast
- Cox Comm
- Exa Networks
- Cisco
- Juniper Networks
- Huawei
- Microsoft
- Level 3 Communications
- Limelight Networks
- NBC Universal
- Nokia
- Orange
- 21ViaNet
- RawFlow
- RSUC/GweepNet
- SaskTel
- Solana Networks
- Speakeasy Network
- Stanford University
- Thomson
- Time Warner Cable
- Turner Broadcasting
- UCLA

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Thank you
BitTorrent Simulation: Bottleneck Link Utilization

P4P results in less than half utilization on bottleneck links

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Abilene Experiment: Charging Volume

Charging volume of the second link: native BT is 4x of P4P; localized BT is 2x of P4P
- P4P achieves similar performance with localized at percentile higher from 50%.
- P4P has a shorter tail.