Effect of Location Awareness Restrictions on the Network Usage of P2P Applications

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Introduction

- P2P protocols are widespread
  - ISPs throttle P2P traffic
- P2P traffic is 'location-blind' [3,5]
  - "Close" peers sought in some protocols
  - Packet route not considered
  - Traffic is routed inefficiently
    - Packets traverse long routes
      - Backbone links congested
      - Unused ISP bandwidth
- Location aware protocols
  - Solution to inefficient routing
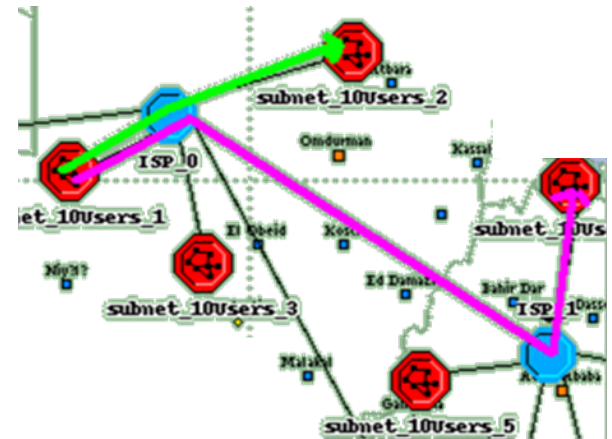
Related Work

- Much of internet traffic is P2P traffic – 70% [3]
  - ISPs throttle P2P traffic
- Inefficiency of P2P from inefficient routing
  - Topology closeness can improve performance [1,4]
  - Current protocols are topology-blind
- Location awareness protocols being proposed [5]

Main Trunk Congestion

- P2P traffic is uniform [3]
- Net traffic arrives in bursts[3]
- P2P funneled to bottleneck links congests network
  - Web user throughput decreases
  - Main trunks constantly congested
- ISPs solve this by throttling

Location Awareness

- Possible solution to congested links and throttling
  - Users first search for resources on local network
- Idea: to decrease packets throttled by the ISP
  - Less main trunk traffic
  - Benefit in E2E delay, RTT
  - Less long distance packets → less probability of throttling
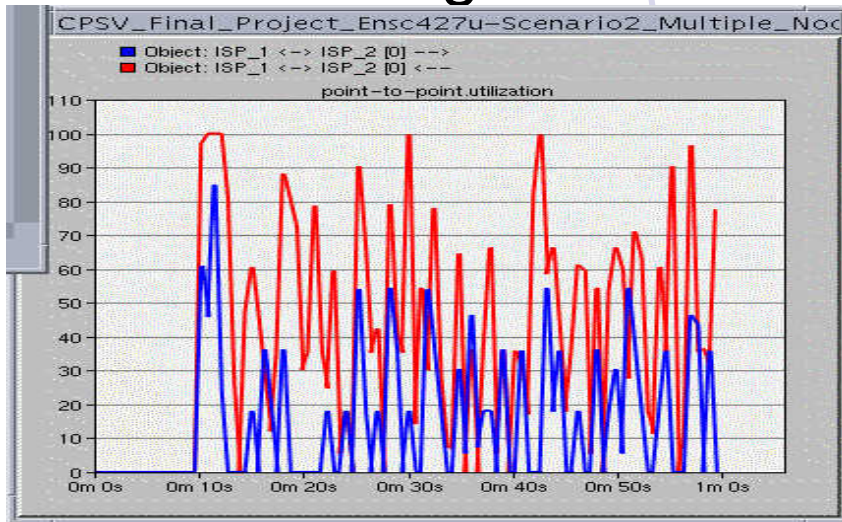
P2P Network Simulation
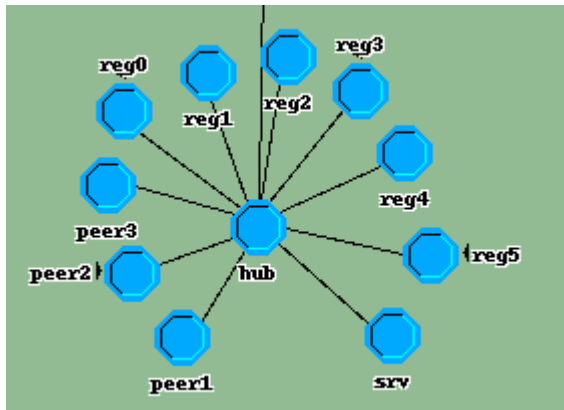
- Three types of users
  - P2P users
  - Web users
  - Web servers
- Traffic throttling in ISPs
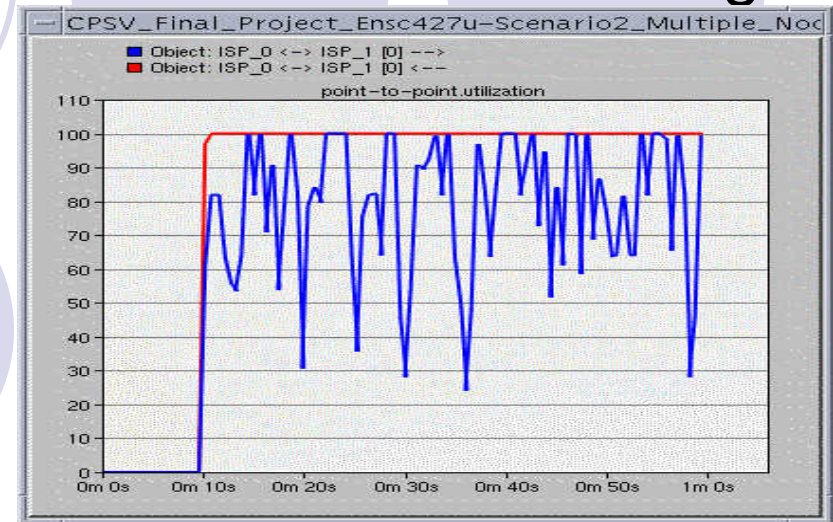 - 20-30% P2P traffic allowed
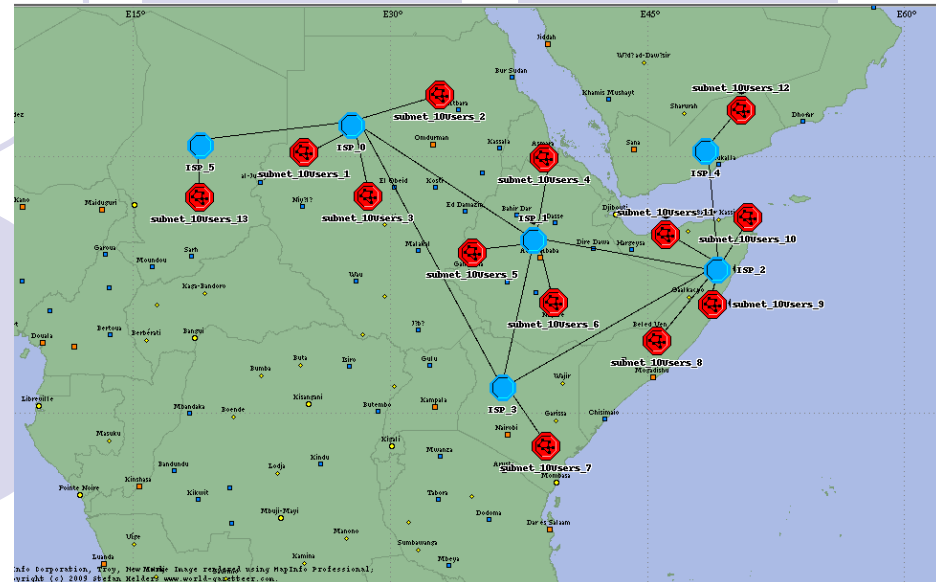
Effect of Traffic Throttling
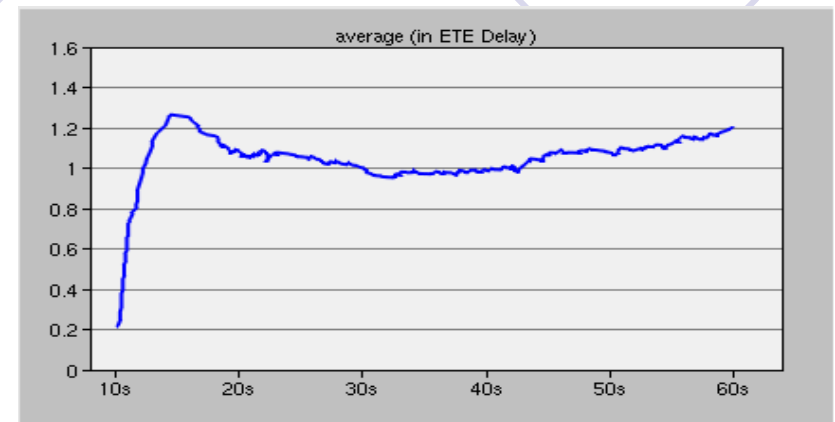
With throttling

No throttling
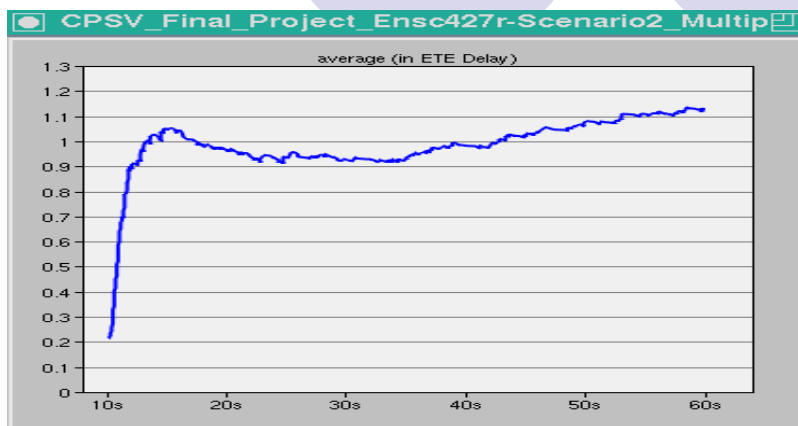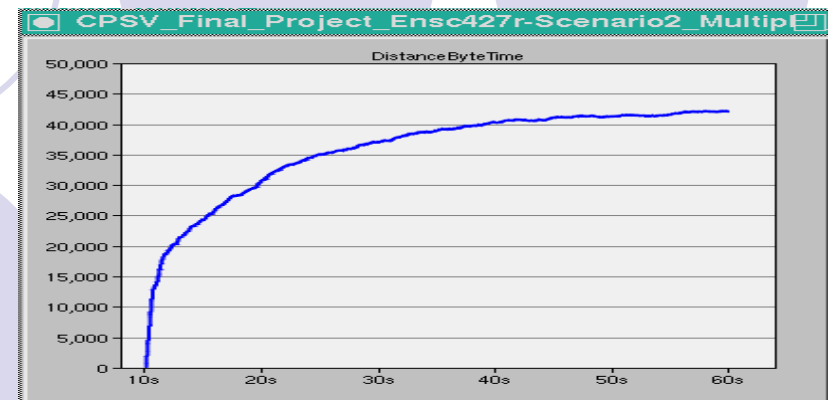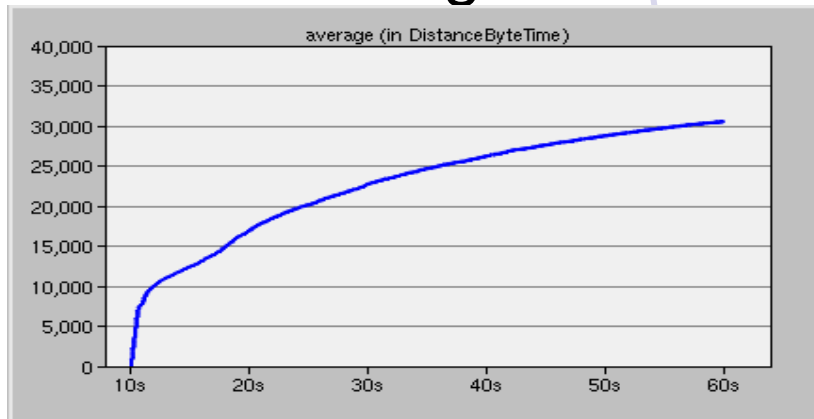

- Net effect of P2P packet throttling
  - Less average E2E delay (over 30%)
  - Location unaware P2P loses many packets (

Effect of Traffic Throttling

## With throttling

No throttling

Effect of Traffic Throttling

- Web users benefit
  - Statistically fewer destroyed packets
  - P2P packets faced with binomial chance of loss
- Location aware protocols benefit
  - Statistically fewer destroyed packets
  - Peers are closer topology-wise
    - Less throttled packets
    - Less RTT, E2E delay

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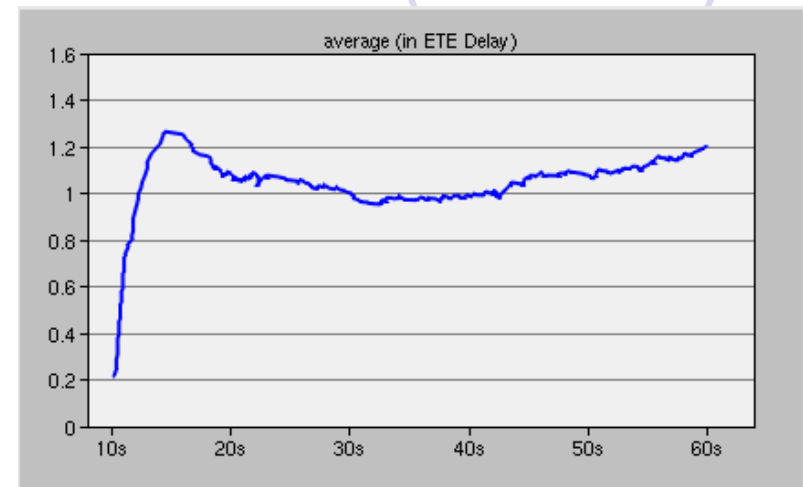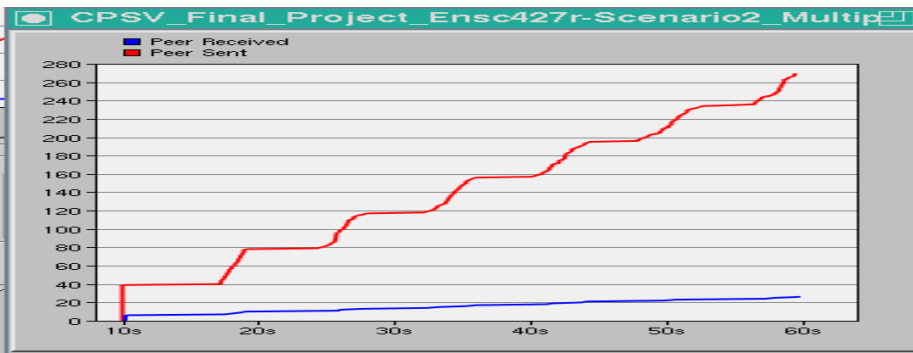
Conclusion

- P2P traffic congests main trunks
  - Decreases benefit from statistical multiplexing
- ISPs throttle P2P traffic
  - Decrease congestion on main trunks to increase QoS to web users but decrease QoS to P2P users
- Benefit to P2P protocols from location awareness
  - Route traffic efficiently
  - Incentive to location awareness for increased performance

Future Work

- Unique packet IDs
- Implement trackers with location information
- Different connection speeds
- Dynamic throttling
- Implement location awareness for peers

References

1. "Study of the location awareness in bit torrent like networks"   URL: http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=4127056

2. "BitTorrent Location-aware Protocol 1.0 Specification" URL: http://wiki.theory.org/BitTorrent_Location-aware_Protocol_1.0_Specification

3. "Impact of P2P traffic to the IP communication network performances" URL: http://www.sparc.uni-mb.si/OPNET/PDF/ImpactOfP2P.pdf

4. "L-CAN: Locality aware structured overlay for P2P live streaming" URL: http://150.140.187.130/getfile.php?fid=36

5. "The BitTorrent Protocol Specification" URL: http://bittorrent.org/beps/bep_0003.html