
P4P : Towards More Productive ISP/P2P Interaction

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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

Observation (cont')

- 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

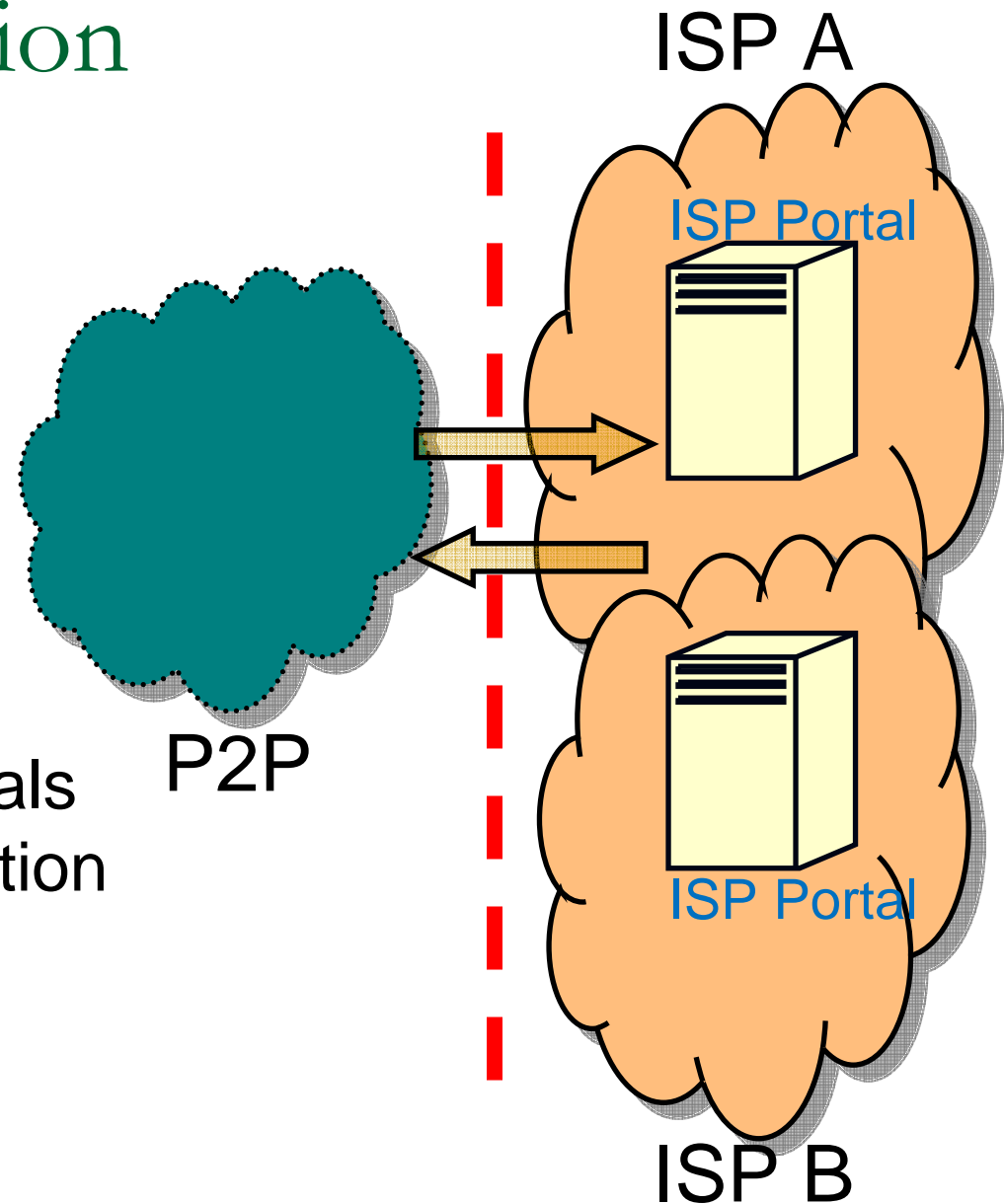
P4P ISP Information Distribution

■ Providers

- ❑ publish information via ISP Portals

■ Applications

- ❑ query providers' Portals to obtain ISP information
- ❑ adjust traffic patterns accordingly

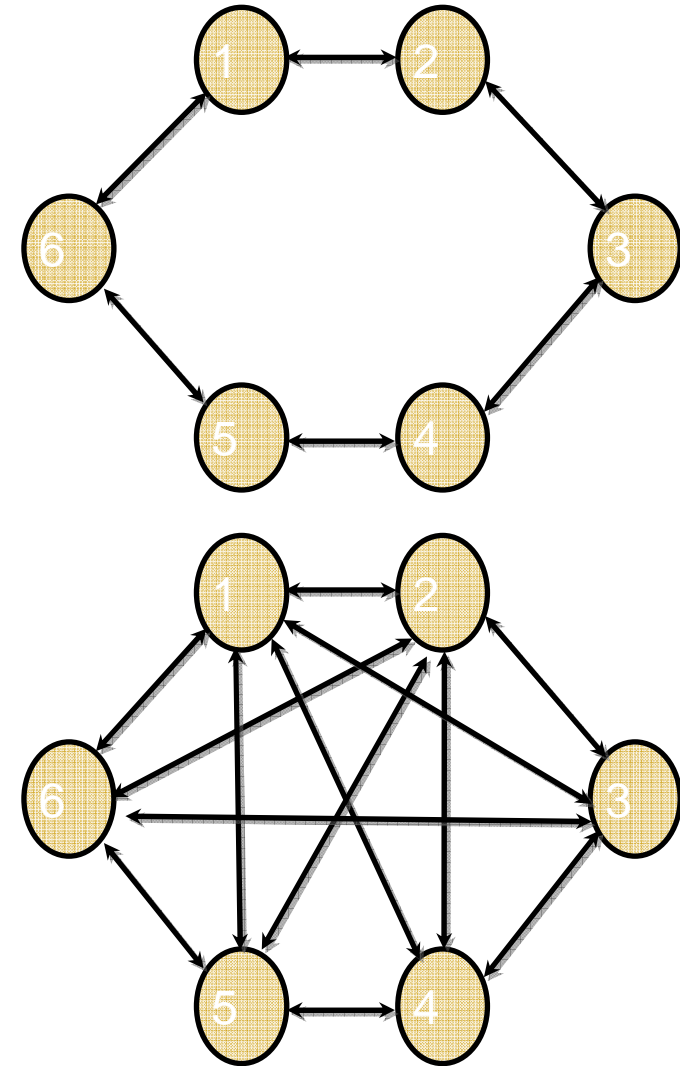


P4P ISP Information Interface Requirements

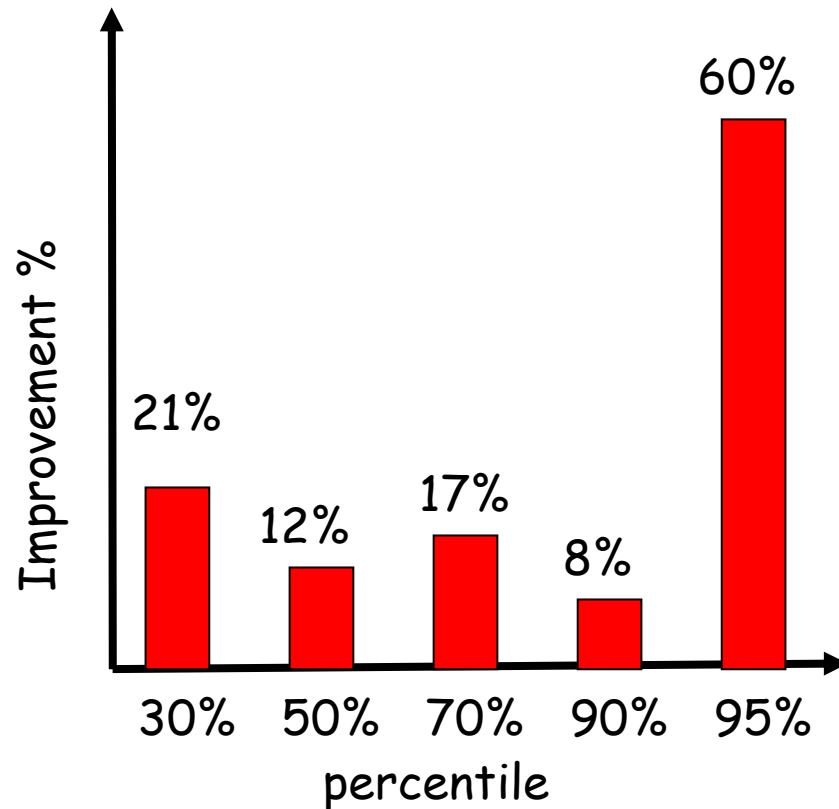
- Economics/design for tussle
 - Extensibility and neutrality
 - Scalability
 - Privacy preservation
-

P4P Information Interface

- Interface design is guided by optimization decomposition of joint ISP/P2P optimization
- Two views:
 - ISP (**internal**) view
 - P2P (**external**) view



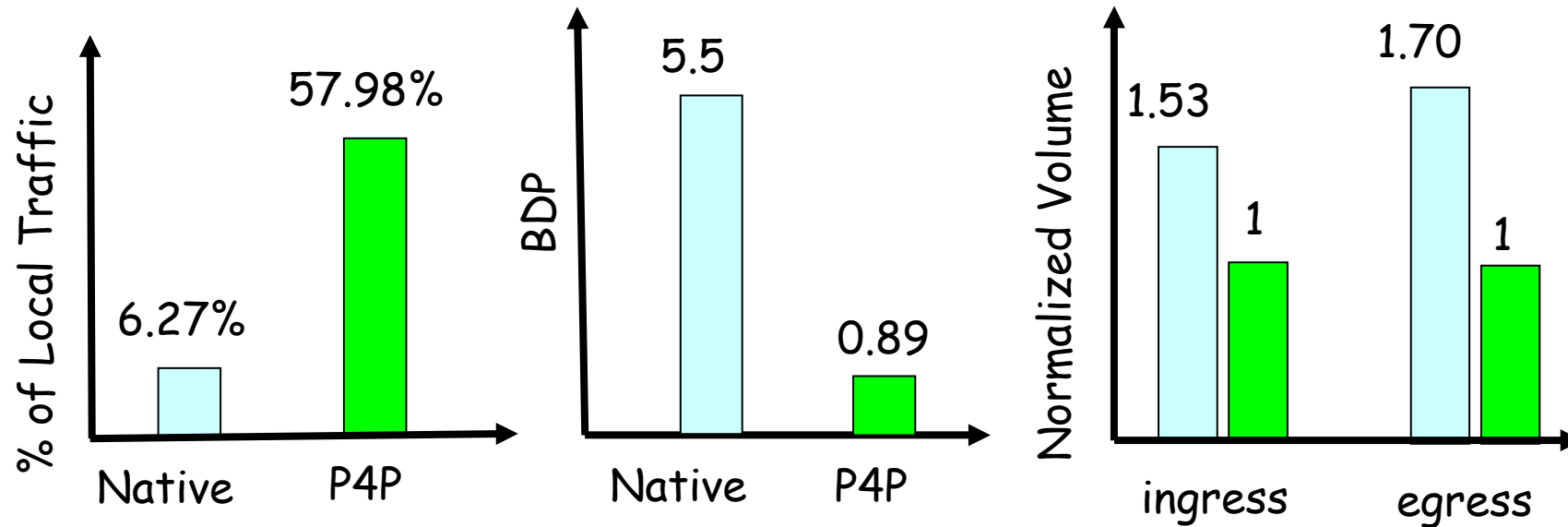
Field Tests: P2P Completion Time (seconds)



	Native	P4P	Improvement
30%	243	192	21%
50%	421	372	12%
70%	1254	1036	17%
90%	7187	6606	8%
95%	35046	14093	60%

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

Field Tests: ISP Perspectives

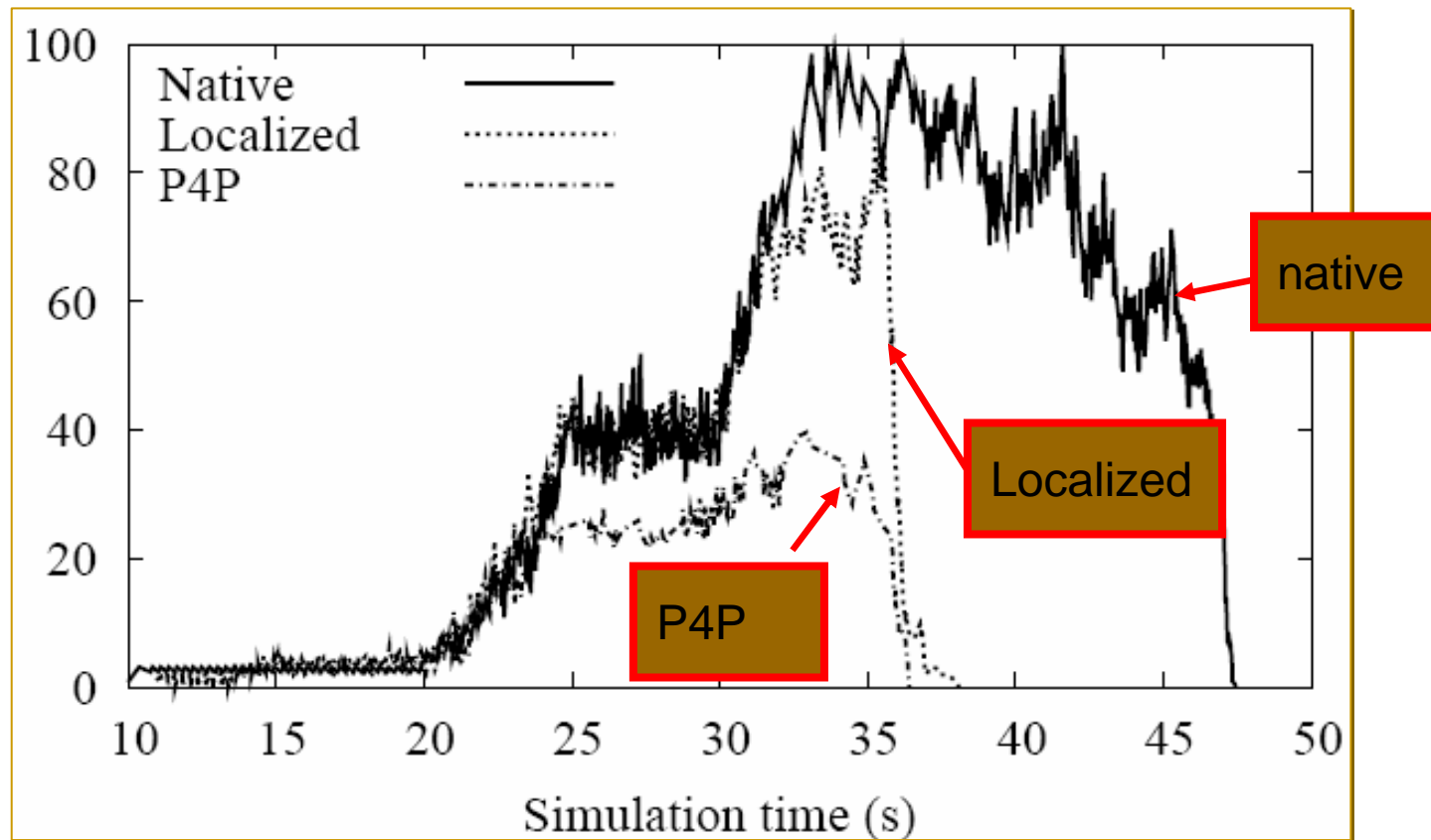


Joint Work in the P4P Working Group

Core Group	AT&T	LimeWire	Velocix
	Bezeq Intl	Manatt	VeriSign
	BitTorrent	Oversi	Verizon
	Cisco Systems	Pando Networks	Vuze
	Comcast	PeerApp	University of Toronto
	Grid Networks	Solid State	Univ of Washington
	Joost	Telefonica Group	Yale University
Observers	Abacast	Cisco	RawFlow
	AHT Intl	Juniper Networks	RSUC/GweepNet
	AjauntySlant	Huawei	SaskTel
	Akamai	Microsoft	Solana Networks
	Alcatel Lucent	Level 3 Communications	Speakeasy Network
	CableLabs	Limelight Networks	Stanford University
	Cablevision	NBC Universal	Thomson
	Comcast	Nokia	Time Warner Cable
	Cox Comm	Orange	Turner Broadcasting
	Exa Networks	21ViaNet	UCLA

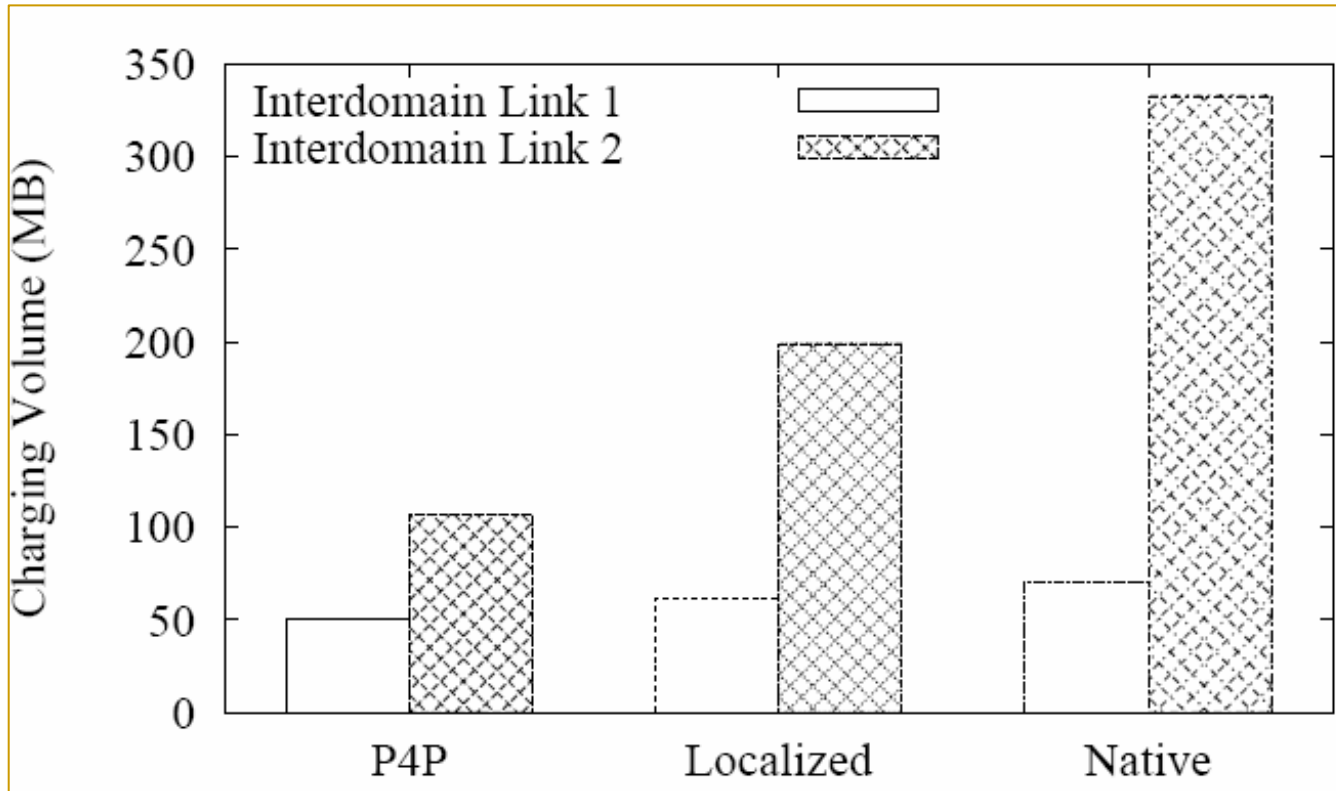
Thank you

BitTorrent Simulation: Bottleneck Link Utilization



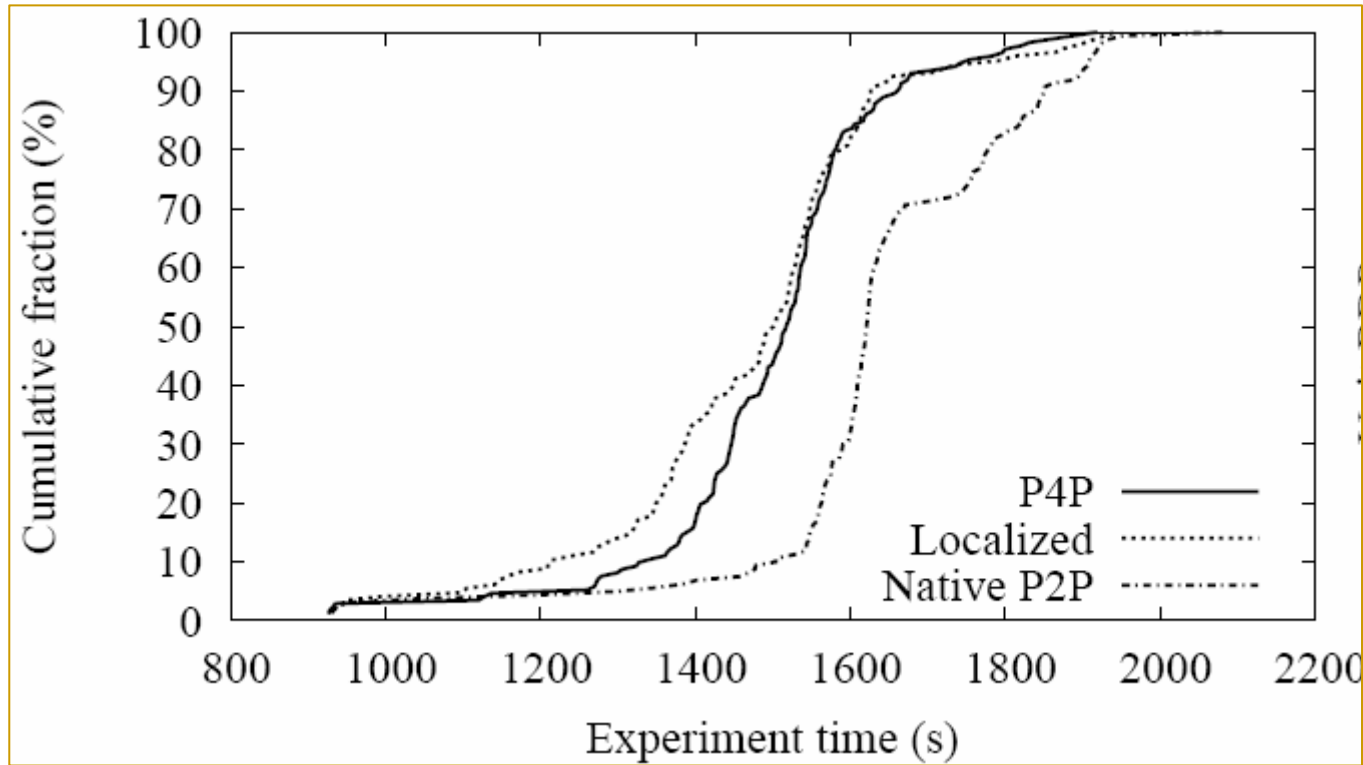
P4P results in less than half utilization on bottleneck links

Abilene Experiment: Charging Volume



Charging volume of the second link: native BT is 4x of P4P; localized BT is 2x of P4P

Abilene Experiment: Completion Time



- P4P achieves similar performance with localized at percentile higher from 50%.
- P4P has a shorter tail.