China Telecom ALTO/P4P Trial

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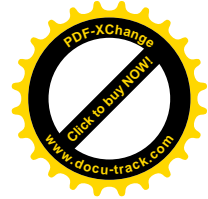
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China Telecom

Contents

- Trial settings
- Trial results

Participants

☐ **Network: China Telecom**

  ➢ The largest broadband service provider in China. Serving over 60 million fixed-line broadband subscribers

  ➢ More than 200 MAN networks managed by 31 provincial networks

☐ **P2P Application: Xunlei (also called Thunder)**
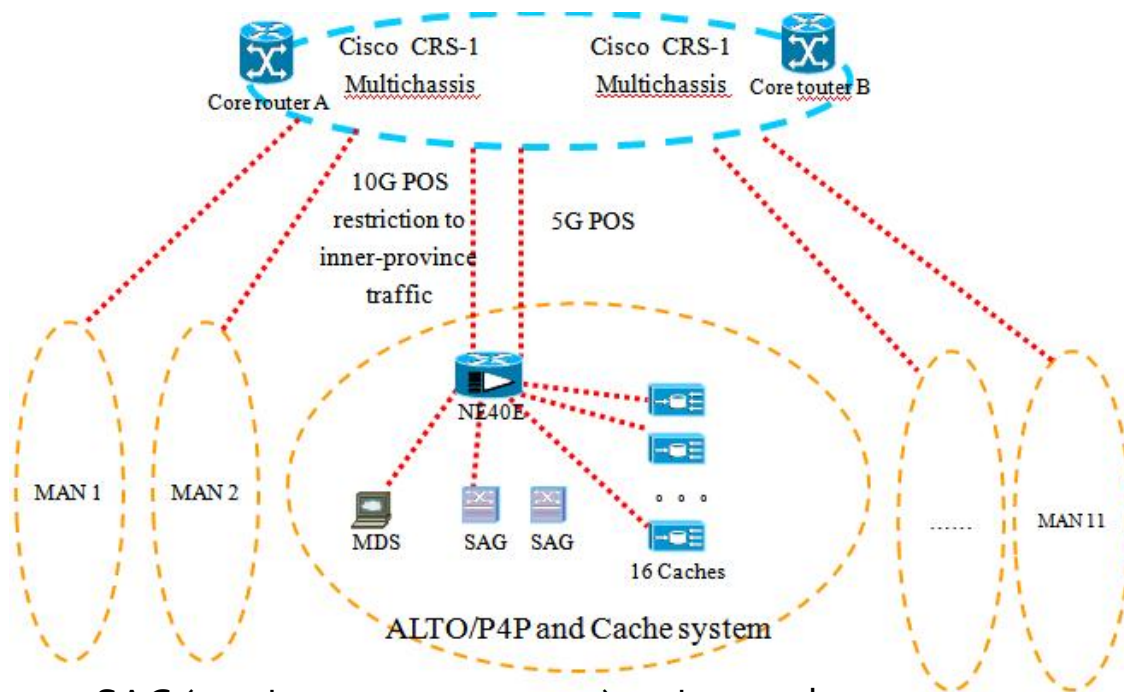
  ➢ Serving 20 million users each day

  ➢ Contributing ~20% inter-province traffic in the trial network

Trial Configuration: Network

- ☐ Trial conducted in one provincial network with 7 million broadband subscribers and 11 MAN networks

- ☐ Trial network deploys both ALTO/P4P Server and Cache Servers

Trial Configuration: Network Components

Core router A   Cisco CRS-1 Multichassis   Cisco CRS-1 Multichassis   Core router B

10G POS restriction to inner-province traffic

5G POS

NE40E

MAN 1   MAN 2

MDS   SAG   SAG

16 Caches

MAN 11

ALTO/P4P and Cache system

- ☐ ALTO/P4P Server: SAG (service access gateway) acting as alto server
- ☐ Cache: 16 Caches with 1.8TB storage and 15 Gbps BW
- ☐ Management: MDS (Management and Deployment System) provides a browser-based interface network operators:
  - ➢ Update the information about network topology, geography location of IP address ,etc
  - ➢ Define traffic management policy
  - ➢ Monitor the SAG and p2p Cache running states
  - ➢ Analyze the statistics of xunlei P2P traffic

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ALTO/P4P Network Configuration

- ☐ Report results of a simple setting
- ☐ PID Map: We define 11 PIDs
  - ➤ PID1-PID11 represent the 11 MANs of the trial network
  - ➤ PID12 represents rest of the Internet
- ☐ Cost Map:
  - ➤ Bidirectional cost between any PIDs from PID1 to PID11 has the same value 1
  - ➤ Bidirectional cost between PID12 and PIDi (1<=i<=11) has the same value 2
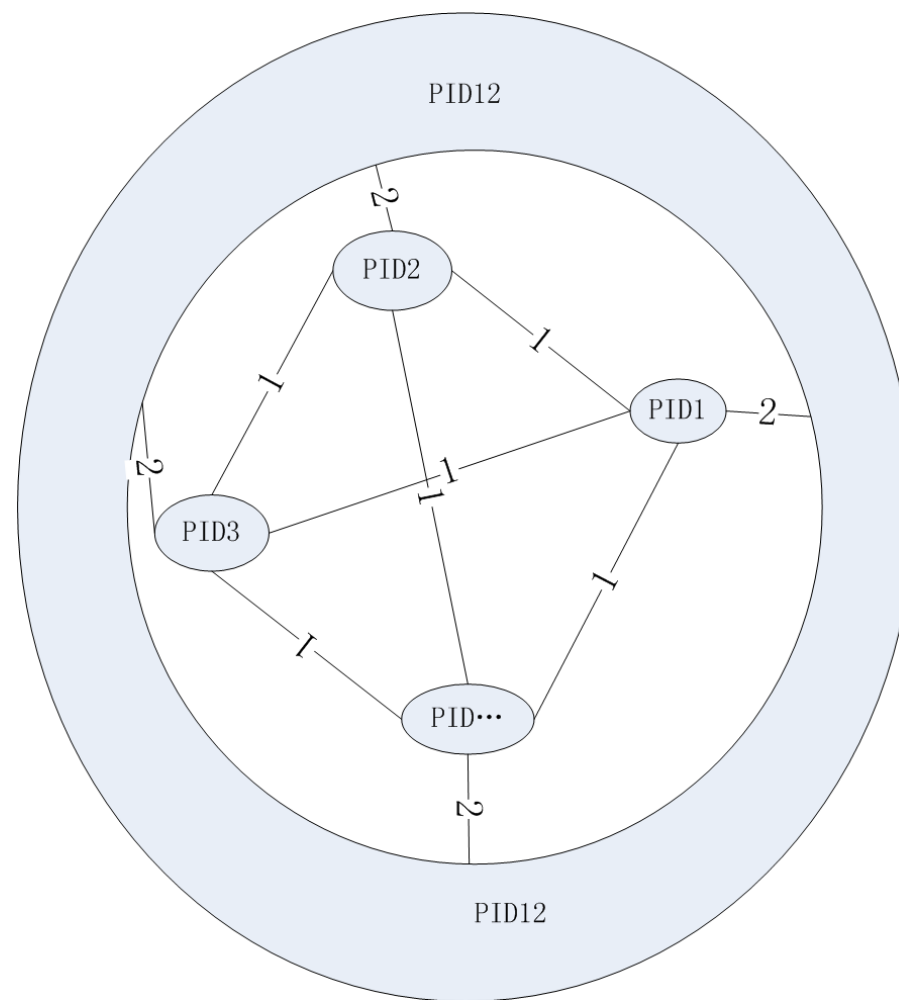
Trial Configuration: Xunlei

- ❑ Xunlei is a hybrid application utilizing both trackers and DHT
- ❑ About 85% of Xunlei traffic controlled by Xunlei trackers
- ❑ Trial modifies only Xunlei trackers

- ❑ Xunlei tracker peer selection algorithm before trial:
  - ➤ Utilizing two properties: ISP ID and UC (upload capability)
  - ➤ Peer selection priority:
    - Same ISP ID > different ISP ID
    - Higher UC > lower UC
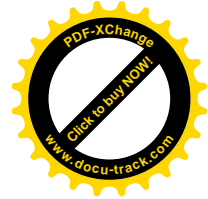
Xunlei's Trial Algorithm: Utilizing ALTO/P4P Info

- With ALTO/P4P information, the ISP ID of a peer in the trial province changes to "ISP ID_PIDx", where PIDx is the PID to which the peer belongs
  - Example: the original ISP ID of a peer in the trial province is "ct", and the peer's IP address belongs to PID1, then the ISP ID of the peer is "ct_PID1"
- Updated peer selection priority:
  - Same ISP ID> Different ISP ID > ISP ID with PIDx suffix
  - Higher UC > lower UC

- If a listing request is from the trial province, the maximum # of returned peers from xunlei tracker is set to 120, not the normal case of 500.
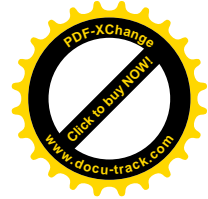
Data Collection Methods

□ **Measuring performance by both CT and Xunlei**

➢ CT measurement: using ISP's network OAM system and DPI system

- OAM: Total (including Xunlei and others) inbound/outbound SNMP traffic flow statistic
- DPI: Detect Xunlei traffic flow; monitor the uplink (only uplink direction) from the province to China Telecom's backbone.

➢ Xunlei measurement:

- Inter-province/intra-province traffic flow statistics [by sampled client logs]
- Average user download speed

Configuration Differences Between This Trial and Comcast Trial (RFC5632)

	Comcast Trial	**CT Trial**
Contents	One content (22 MB) divided into 5 swarms for comparison	*All* Xunlei file/streaming contents in 4 months
ALTO/P4P conf.	Coarse-grain (22 PIDs) and fine-grain (1182 PIDs)	12 PIDs
P2P App/Peer Selection Alg.	Pando/Coarse-grain; Fine-grain; Generic	Xunlei's algorithm (slide 8)
Utilizing Cache	No	Yes (16 servers)
Monitoring	Pando client logs	Xunlei logs; CT's NMS system; CT's DPI detection

Trial Results: No Caching Servers

☐ Reduction of Xunlei inter-province outbound traffic

  ➢ 42.77 Gbps (51% of outbound)

☐ Reduction of total inter-province outbound traffic

  ➢ 31.58 Gbps

☐ Reduction of total inter-province inbound traffic

  ➢ 12.86 Gbps

☐ Average user download speed

  ➢ Slows down ~10%

Trial Results: with Caching Servers

- ☐ Adding caches (16 caches, 1.8TB each and 15 Gbps total BW)

- ☐ Reduction of Xunlei inter-province outbound traffic
  - ➢ 40 Gbps (~50%)

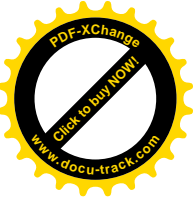- ☐ Reduction of total inter-province outbound traffic
  - ➢ 39.18 Gbps

- ☐ Reduction of total inter-province inbound traffic
  - ➢ 28.3 Gbps

- ☐ Average user download speed
  - ➢ 5% increase with 4 Gbps cache BW, and 80% cache occupancy

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Conclusions and Future Work

- ALTO/P4P information can substantially reduce Internet egress/ingress traffic

- Observed slight slowdown (~10%) in application speed without cache servers

- Network storage can recover lost speed:
  - 4 Gbps ISP cache BW => 40 Gbps egress BW reduction and 5% speedup

- Future work:
  - Evaluate more details on the slow down and determine possibility of improving speed
  - Broader deployment and more diverse types of applications
  - Collect ISP configuration and P2P application algorithm guidelines/best practices and contribute to ALTO.

Any comments or questions?