From ISP/ICP Business Models to Internet Economics

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Self introduction

• ~20 years in industry (Bell Labs, DEC, Sun Labs) in US

• and ~10 years as a professor in CUHK, Hong Kong

• interested in Internet economics, and have written some papers (mostly abstract)

• Will talk about trends and issues in practice

• not an expert of Internet businesses in China; will use some examples for discussion
ISPs in China

The two giants:
- China Telecom
- China Unicom


There are some local ISPs, much smaller scale

Education network:
- CERnet (20M users from universities)
Major Content Providers and OSNs

The big three Internet companies:
• Tencent – Instant messaging, games etc
• Baidu – Google of China
• Alibaba – eBay or Amazon of China

Social Networks:
• Renren, Kaixin – Facebook in China
• Sina Micro-blog – like Twitter

Portals:
• Youku, Tudou – like Youtube
• Sohu, Sina – like Yahoo
Major CDN and P2P platforms

CDN
- China Cache - http://www.chinacache.com/

P2P and indexing
  - 290M active users (canceled IPO in 2011)
- PPLive etc – got US$250M from Softbank (Feb 2011)
  - 105M active users
- Tencent – Instant Messaging, games, social network etc
  - 800M+ active users
  - Supports p2p downloading, and “cloud downloading”
Network convergence in China

- Convergence of telecom (including mobile), TV broadcasting, with Internet
- A lot of regulation issues - these industries are under different ministries
- Re-alignment of vertical businesses
- Important questions:
  - Who can keep the users?
  - Who has the right to manage contents?
Case study: Cloud Downloading

• Functionality
  – User requests content (in WWW, BT etc), especially cold content
  – Cloud downloads, then informs user
  – User gets content at very high speed

• Subscription based
  – Provided for special Tencent members who pay
  – After one year, ~5M active users in a month

• Operation
  – Large data center to store downloaded content
  – High BW connection from data center to major city areas
    • Collaboration with local ISPs
    • Via private network
    • Via CDN
Illustration

user

Slower download, even with P2P

Large file

High BW path, using P2P as well when available

Data Center (caching)

Multi-path fast downloading

cloud
Cloud Storage

• Allow user upload to cloud as well
• Supports large files, e.g. videos and games
• Content-based identity (via hashing)
  – Detects duplicates
  – Authentication

• Is it also a networking service?
Cloud services from US

- Google YouTube, Gmail, etc
- Amazon Silk
- Netflix
- ...

Dec 2011
Big idea 40 years ago

- To support dynamically arriving elastic traffic
  - replace *circuit switching* by *packet switching*
  - *statistical multiplexing*
  - Internet
New big ideas

• To support large scale content distribution
  – Use multi-path and load balancing
    -> true congestion control
  – Use replication/caching along the way
    -> transport sharing
  – Use dedicated/private network
    -> qos

>>>>> CDN, BitTorrent, Youtube, Cloud downloading…
Two roles for networking services

• Public good
  – Universal information access, and connectivity
  – Freedom of speech (?)

• For profit services
  – Content distribution
  – Social clubs
  – Indexing, search, recommendation…
  – Commerce, banking…
  – Business needs
Key ingredients for any business

1. Good stuff to sell – e.g. content
2. Quality of service
3. Channels – to reach customers

Is Internet good at these?
- It is essential for (3)
- Surprisingly, it is also good at (1) to some extent where cometh the content in Youtube, Facebook?
- It is not adequate for (2) that’s why private networks, storage/cache etc added
Future Internet picture?

For-profit clouds

access to public net

Transit ISPs

“public” internet

Access networks
Access providers

• Access providers are the channels to users
• Ideally, users should have access to multiple providers
• Given wireless technology, this should become less a problem
• If an access provider is a monopoly in a local market, it should be subject to regulation
Transit providers

- They can play the role of transit ISPs; in this role, they need to deal with net neutrality type of regulations

- They can sell/lease fiber to cloud service providers for their private networks; in this business, there should also be equal access regulations
Peering

• Between Cloud services and access networks
  – Similar to relationship between any business and its channels
  – No clear conclusion of whether “content is king” or “eyeball is king”

• Between ISPs
  – Bilateral peering as today
Net neutrality

• Generic analysis of a “platform” in economics
  – Nice economic models of “two-sided” market
  – Showing benefits of network effect in users attracting applications, and vice versa

• Government’s control of monopoly practices
  – This is very complicated, probably not amenable to mathematical analysis
Summary

• Brief overview of ISPs and ICPs in China
• Examples of business models and implementation of user services in today’s Internet
• Analysis of technology and business trends
• Discussion of roles and relationships of different players
• Concluding observation: Internet needs to fulfill two different roles, which necessarily leads to its public and private sectors.