ChinaNetCloud
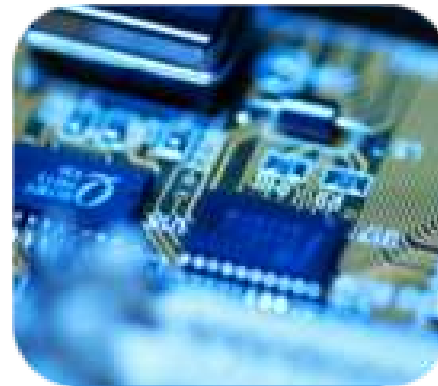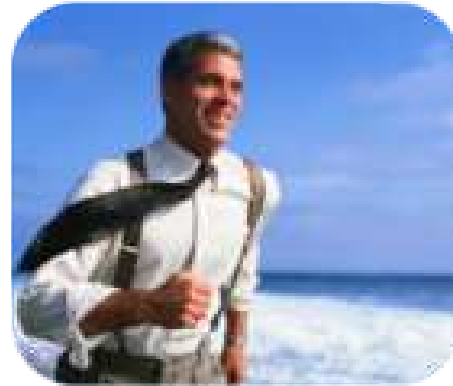*Running the World's Internet Servers*

Dealing with Chinese Network Anatomy

About Architecture

By Steve Mushero

Overview

- Talk about Chinese Internet Structure

- Chinese Internet Problems & Issues

- Strategies & Solutions

- Advice

About Steve

- Founder, CEO & CTO of ChinaNetCloud
  - Before that, CTO of Tudou（土豆网）

- Seven years in China
  - From Silicon Valley, Seattle, New York

- 20+ years experience as CTO
  - Experience in dev & ops

About ChinaNetCloud

Founded in Shanghai in 2008

by Silicon Valley Technology Guys
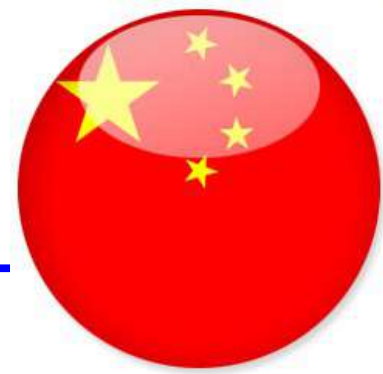
Vision: Run All the World's Internet Servers

We manage servers & systems

for Chinese Internet & Game Companies

Thousands of Servers - Hundreds of Customers

We've seen every type & size system

China Overview

- China is World's largest Internet

- But Infrastructure has unique characteristics

- Difficult for world-class performance / user experiences

- Especially modern apps:
    - Mobile apps, ads, & e-commerce
- End-user speed linked to success & profits

China Internet Basics

- World's largest – 500M users

- Very advanced / fast
  - 1-2-3 Mbps at home
  - 5-10-20 Mbps at work
  - 1-10-50 Gbps at IDC

- But slow
  - Congestion
  - Regionality

Monopoly ISPs

- China Telecom – South 21
- China NetCom – North 10
- China Mobile - GPRS
- China UniCom – iPhone
- CERNET - Students
- Several more like Railcom

- Unicom bought Netcom
- Mobile bought Railcom
- Telecom bought Unicom CDMA

Internet Challenges

- Poor interconnections
- Overloaded links
- Heavy-bandwidth uses

- Within Region
- Between Regions
- Internationally

Internet ISP Basics

- Each ISP is REGIONAL
- Actually one per province
- And one per large city
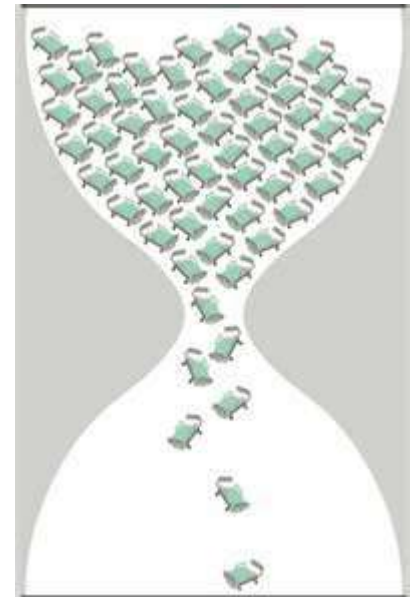- And Mobile is separate

So not one company
   Ex: Telecom is 31 companies

- They don't cooperate well

Bottlenecks

- Within & Between Regions
- Heavy traffic
    - P2P sharing
    - Video (Tudou, etc.)
    - Games, Music, etc.

- Mobile speed limited
    - They have to buy bandwidth
- Can use Mobile IDC, but . . .
   - Terrible service

Bottlenecks

- ISPs don't care as no effect on revenue
  - Challenges of limited competition

- Even worse as they use proxies, back channels

- Especially in smaller provinces
- And CERNET for students
 - Proxies in closets

Internet Challenges - Routing

- ## BGP not common
  - Requires cooperation
  - Back to 1990s methods

- ## Multi-line common
  - Multi-IP per server
  - Routing nightmare

- ## BGP increasingly used
  - Especially for mobile
  - Expensive, only high-end
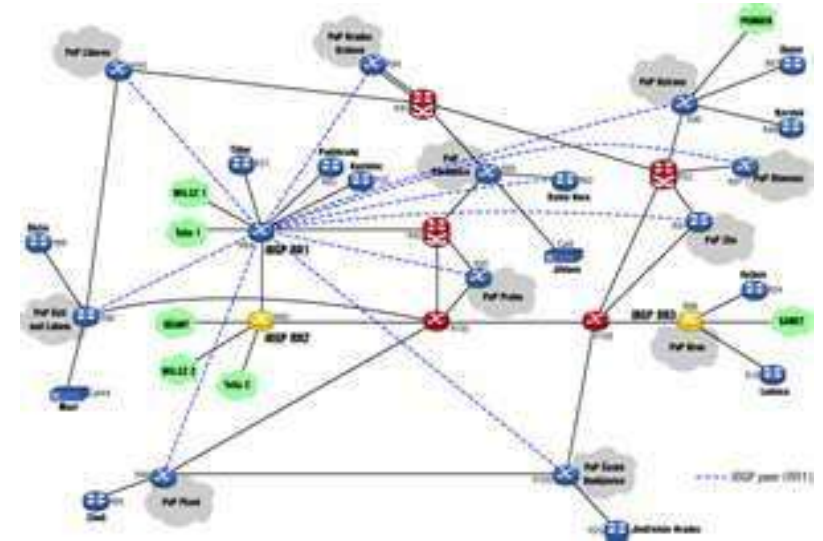
International Links

- Only a few links, bottlenecks

- Great Firewall of Fun

- Often unstable / highly variable

  - Good one day

  - Then bad for an hour, day, week

- Cannot depend on them

- HK best, Japan next, beyond . . .
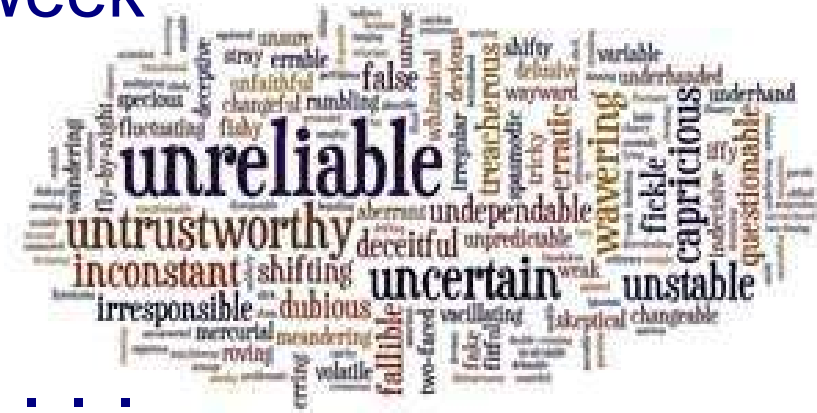
Internet Challenges - Students

- Universities have separate network

- CERNET

- Hard to get to (expensive)

- Often use async routing to save money

- But useful for brands, games, etc.

  - Use BGP / CDN

Internet Challenges - Mobile

- **Three carriers**
  - Separate from land lines
- **Traditionally used Mobile IDC**
  - Poor service
- **But also 50%+ on Wifi**
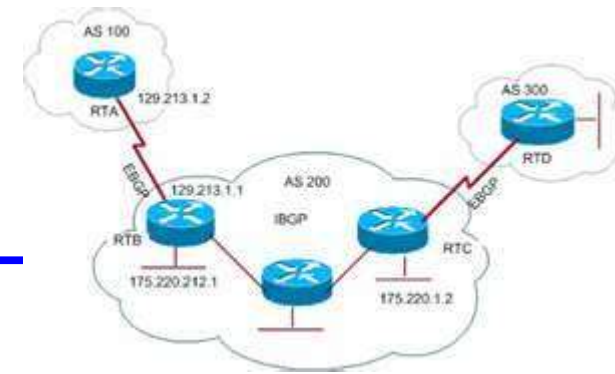 - Makes good routing & IDC hard
- **Moving to 3-line BGP**
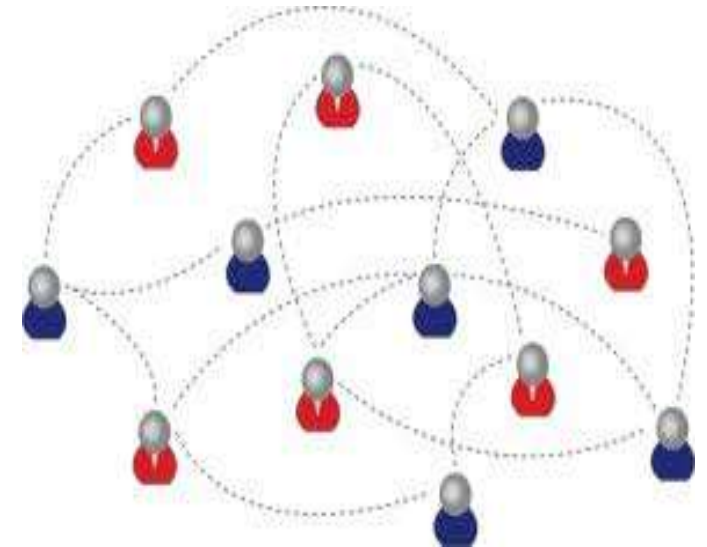
Industry Specific Issues

- **E-Commerce**
  - Response time
  - Reliability

- **Advertising**
  - Performance

- **Gaming**
  - Response time
  - Multi-user zoning
  - Big Downloads

BGP

- Increasingly important

- 2, 3, 8 line – Very, very few 8 line

- Usually best, BUT . . .

- Expensive

- Not always good

  - Poor links to other ISP

  - Strict bandwidth limits

- Not always real

  - NAT, other methods

IDC Data Centers

- **Increasingly important**
  - Mobile and $$ driving
- **Highly variable bandwidth**
  - Understand bandwidth
  - When 100M is NOT !
- **Expansion a big problem**
- **Service a big problem**
- **Get what you pay for**

Strategies Overview

- Good Location

- Good Bandwidth

- Good Design

- CDN

- Monitor

- Advanced options

Locations

- Single vs. Multi-location

- Multi-location very difficult
    - Very rare in China
    - Games or HA failover

- Best to choose 1 good location
    - Grow and use 2nd for HA

- CHOOSE WELL

Locations

- Best you can afford
- Ask about service
- Ask about expansion
- Think about mobile
- Avoid 3rd tier cities
- Avoid 3rd tier IDCs
- Avoid 2nd tier if you have $$
- Think about clouds . . .

Choosing IDCs

- Get the best you can afford

- Be careful, hard to change later

- Connectivity First
  - Including DDoS, ARP, Net

- Service Second, important
  - 24x7 Access
  - Remote Hands

- ChinaNetCenter, 21ViaNet, SRT

Connectivity & Bandwidth

- Get the best you can afford

- Think about users' location

- Single vs. 2 vs. 3 vs. 8 line

- Direct vs. BGP

- For mobile, remember Wifi

- Buy the Best & CDN the Rest
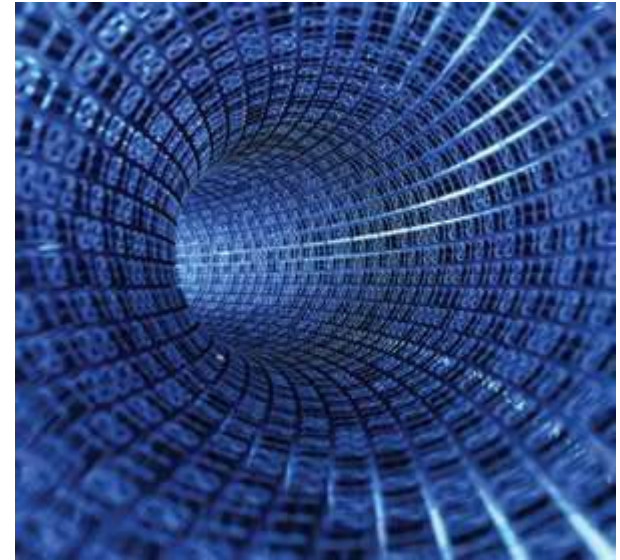
Performance

- Think small & fast

- Images, HTML, CSS, JS

- Follow all best practices

  - YSlow, etc.

  - Test & Analyze

- Use AJAX if possible

- Other push, XMPP, node.js

- CDN as much as you can

AJAX & Caching

- A secret to perceived speed
- Use statics as much as you can
    - Long statics & rename
- Use semi-statics
    - Cache 1, 5, 60 minutes
- Carefully consider other objects
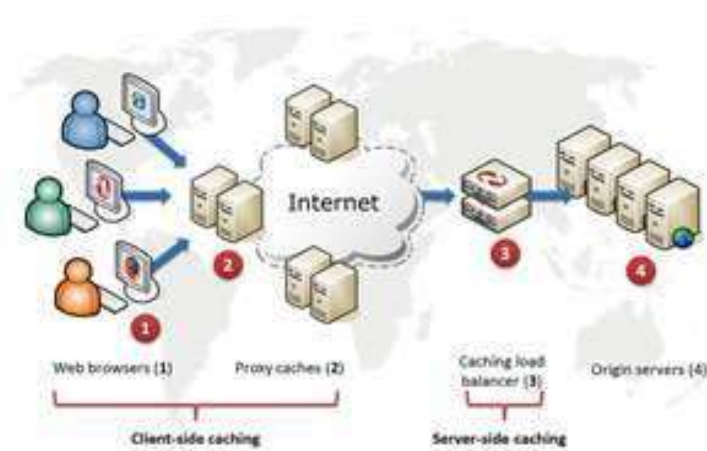
Push & Async

- Latest trend to perceived speed

- XMPP

  - Via OpenFire

  - Messages, stats, updates

- Node.js

- Careful how you scale

  - 250,000 per server ?

- Careful of bad connections

  - Re-connect, lazy connect

Best practices via YSlow

- Study Yahoo, Google & others

- Run YSlow & other tools

- Also GT Metrix

Leveraging CDNs

- Another secret to perceived speed

- Also reduces expensive IDC bandwidth

- Careful of version, expiration, names

- WSA, too
  - Whole Site Acceleration

- ChinaNetCenter, FastWeb, ChinaCache

- Clouds have CDN, too – AliYun, Amazon

- Use a CDN, Always !

Monitoring

- Several good monitoring services

- From backbone or end user
  - All around China
  - Check each ISP
  - Check each CDN

- But Expensive !

- Network Bench, Gomez, Jiankongbao

Using Clouds

- Very flexible

- Understand limits

    – 100 Questions / Issues

- Good International - AWS

- Still limited in PRC

    – But Improving

    – Good Bandwidth, CDN

    – Aliyun working hard to be AWS

    – A few smaller – 21ViaNet Shanghai

Cross-Border International

- Same but Different

- Consider cross-region

  – PRC only

  – Foreign only (where?)

  – Both

    - Separate – Any Sync ?
    - Integrated – Rackspace HK

- Use cloud – Amazon

Summary

- Chinese Internet Big

- But difficult

- Choose location & IDC carefully

- Design your app well

- Use CDN

- Monitor

- Be fast . . . users be happy . . .

Questions