3TNet: High Performance Broadband Information Network in China

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Outline

- Project
- Network Architecture
- Field Trial
- Summary

Challenges

- The bandwidth of “broadband” provided by carriers is typically 1-2 Mb/s based on xDSL technologies today. It cannot satisfy the requirement of high quality video services.
- When the access bandwidth is increased drastically, what’s the impacts to the core network?
- Cabled TV network, which is uni-directional without interaction, upgrades to bidirectional difficultly.
- The reliability of Internet is less than that of telephone network (five 9’s). Furthermore, Internet is vulnerable by DDoS, worms, and viruses. It takes risks in using the Internet for mission-critical operations.

3TNet Project

- It aims to build a high performance trial network to support large-scale concurrent streaming media and interactive multimedia broadband service.
- It employs Tbps network equipments developed by Chinese vendors, collaborates with carriers and service providers, develops new business model, and deploys in Yangzte river delta with supports by local government.
- The project was funded by “863” Program, ~35M USD.

Participants

- Carriers and SPs:

  China Telecom, Shanghai TV, CETV, B-Star

- Venders:

  Huawei, Fiberhome, ZTE, Harbor, Amoi, ...

- Universities:

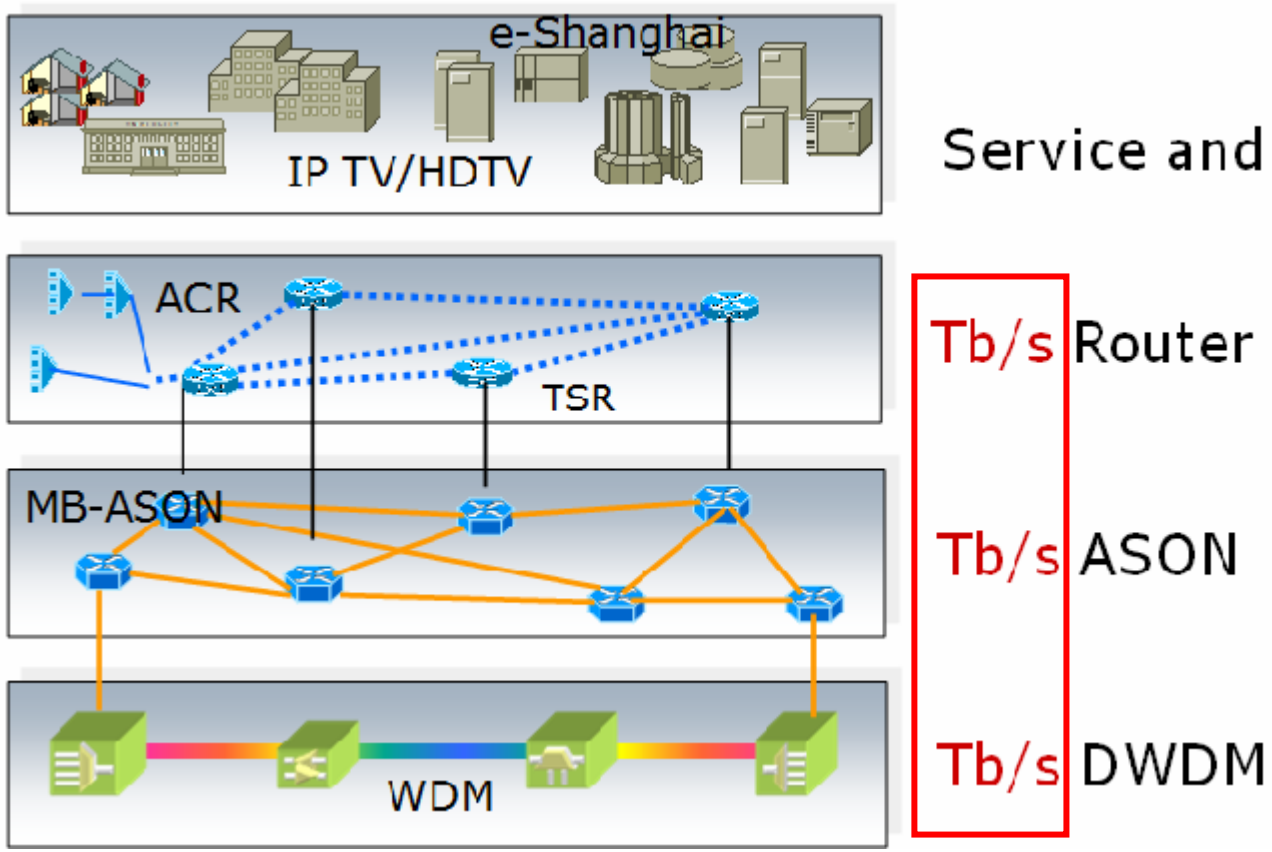
  Tsinghua U. PKU, Fudan U., SJTU, ZJU, USTC...

- Institutes:

  CAS (IoA), RITT, ABS

A Layered View of 3TNet

3TNet is a circuit-switched and packet-switched hybrid network to support large-scale interactive broadband streaming media.

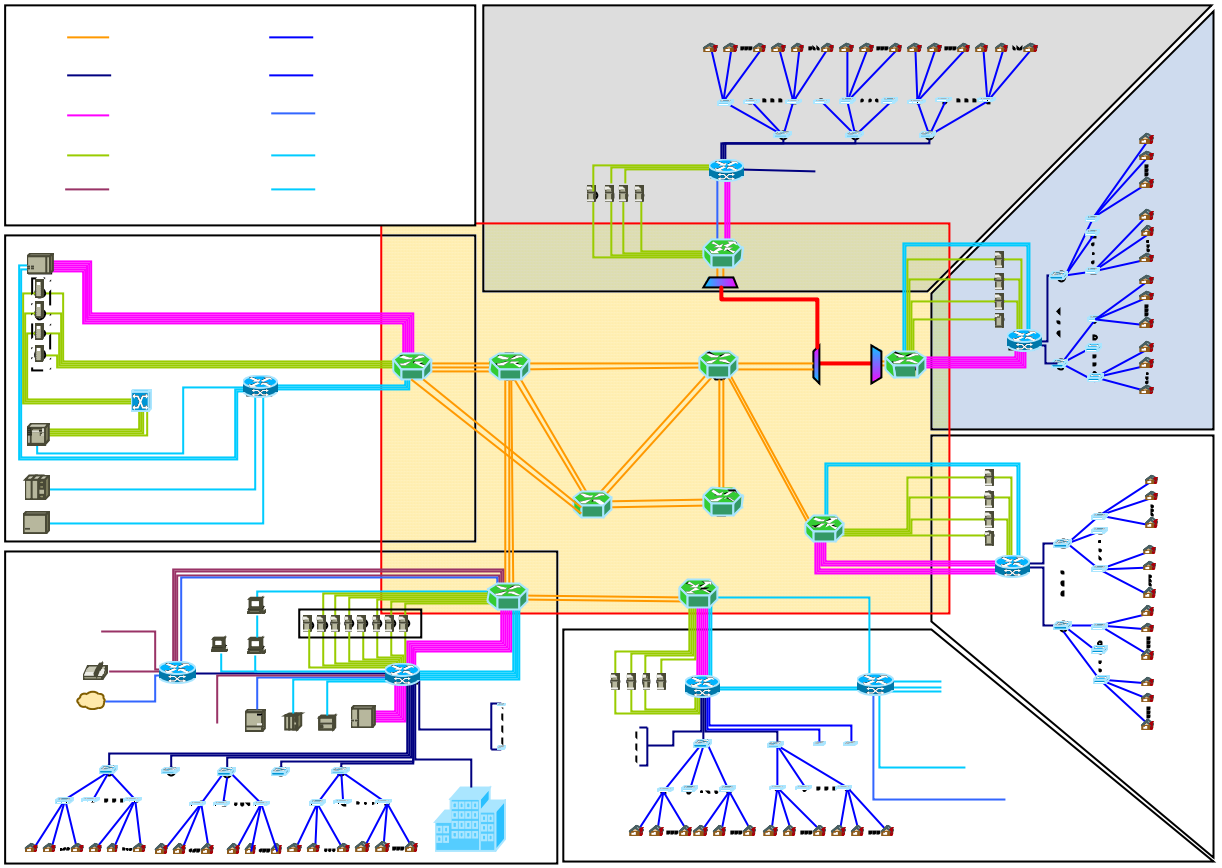


Field Trial in Yangtze River Delta

Yangtze River Delta is a region including Shanghai, Jiangsu, and Zhejiang.

3TNet Topology

Head End, 100 Channels (including HDTV), 3,000 hrs VoD



Nanjing, SEU, 5000 users

Hangzhou, ZJU, 5000 users

China Telecom, 1000 FTTH Households

SJTU, 5000 user

B-Star, 12000 Households

1 operation center, 2 network TV stations, ~28000 real users in 3 cities.
3Tnet provides 45Mb/s guaranteed bandwidth for each end user.

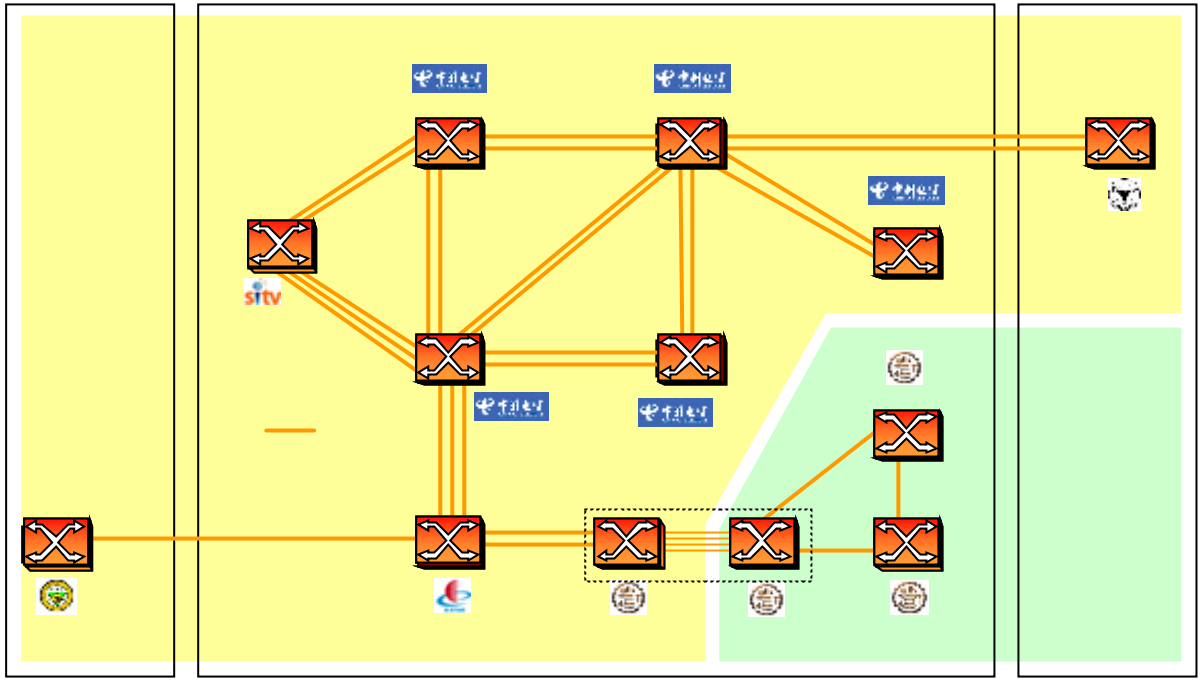
Long Distance Links

- Shanghai-Hangzhou
  - Installed 4*40 Gb/s DWDM
  - Upgradable to 80*40Gb/s DWDM
- Shanghai-Nanjing
  - 2*10 Gb/s

ASON Layer Topology

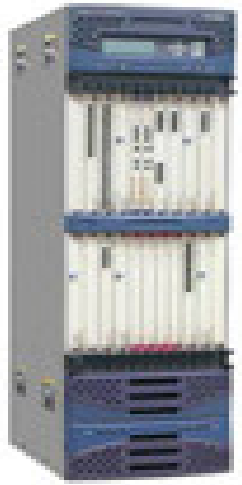
Huawei's
ONS9500

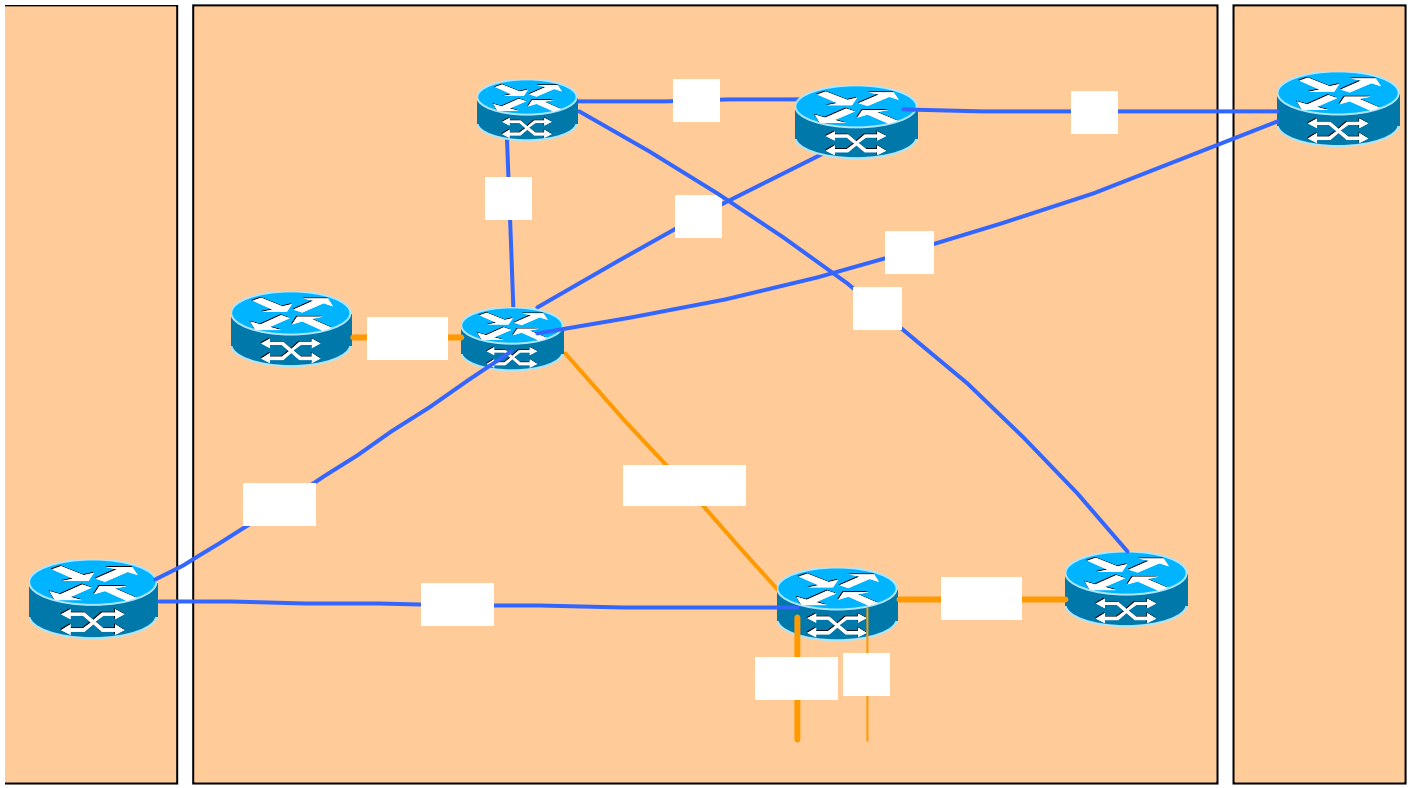
- 13 SDH based OXC nodes
- GMPLS control plane
- Two domains



Fiberhome's
Fonsweaver 780

IP Layer Network Topology

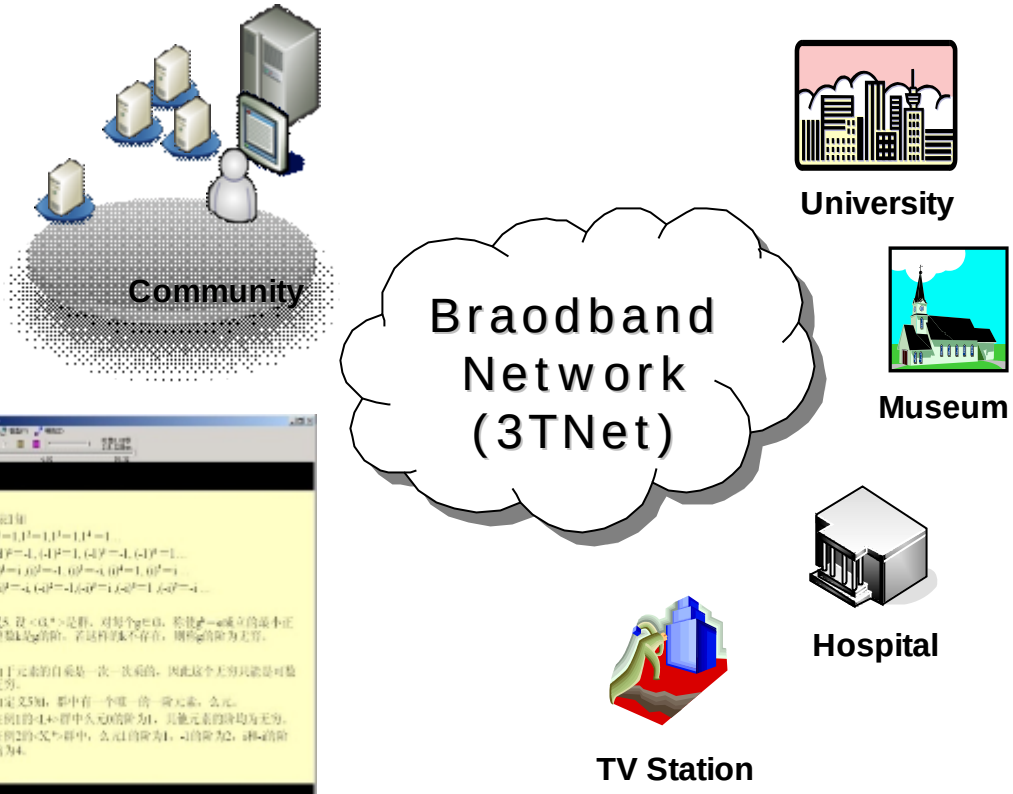


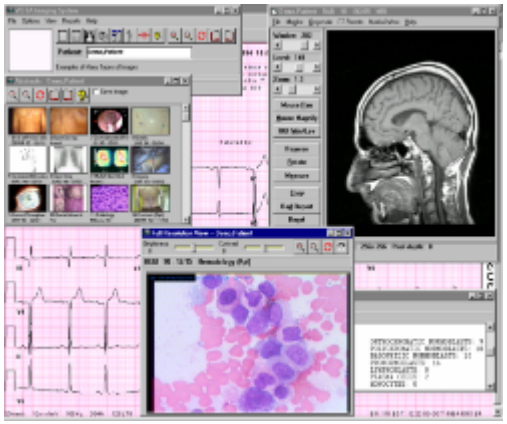


- SR: switching router, TSR: Tb/s SR, Huawei's Quidway NE80
- ACR: access convergence router, Huawei's Quidway ME60

Value-Added Service: E-Shanghai

- e-Learning
- e-Entertainment
- e-Health
- e-Show
- e-Science





1. Hybrid Multicasting: Y. Jin, ECOC 2007 (Invited)
2. Distributed Computing over ON: W. Guo, OFC 2008 (Invited)

What's the next?

- New Generation Dependable Network
  - ~64M USD, 2008-2010
  - First round call for proposal:

    http://www.most.gov.cn/tztg/200711/t20071107_57004.htm
- Network architecture
  - Core: Optical Transport Network

    ODU 1/2 grooming, wavelength switching (ROADM)
  - Aggregation: Packet Transport Network (T-MPLS, PBT)
  - Routing: Reconfiguration, Virtualization, etc.
  - Access: WDM-PON, WiMax, Ethernet over Coax, ...
  - App. & Service: Collaborative HD Video Editing, Network 3DTV, ...
- Experiments
  - National broadband network and service testbed
  - International collaboration and internetworking

Summary

- 3TNet is a circuit-switched and packet-switched hybrid network to support large-scale inactive broadband streaming media.
- A large-scale field trial is now carrying out in Yangtze River Delta. There are ~28000 real users in 3TNet. The average bandwidth of each end user reaches up to ~45 Mb/s.
- 3TNET is going to be upgraded and deployed in scale in China in the next three years (beyond 3TNET).
- International collaboration is warmly welcome!

Thanks

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