

# Broadband Strategy & Broadband Network Trends of China

China Academy of Telecom Research  
Ministry of Information and Industry, China  
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# 提纲

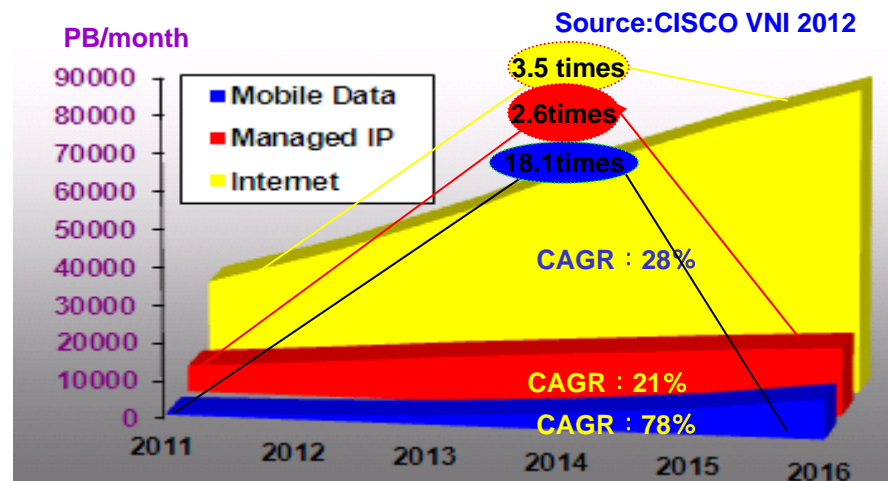


**Trends of Broadband Service**

Broadband Strategy of China

Broadband Network Status & Trends

# Huge Requirements of global broadband services

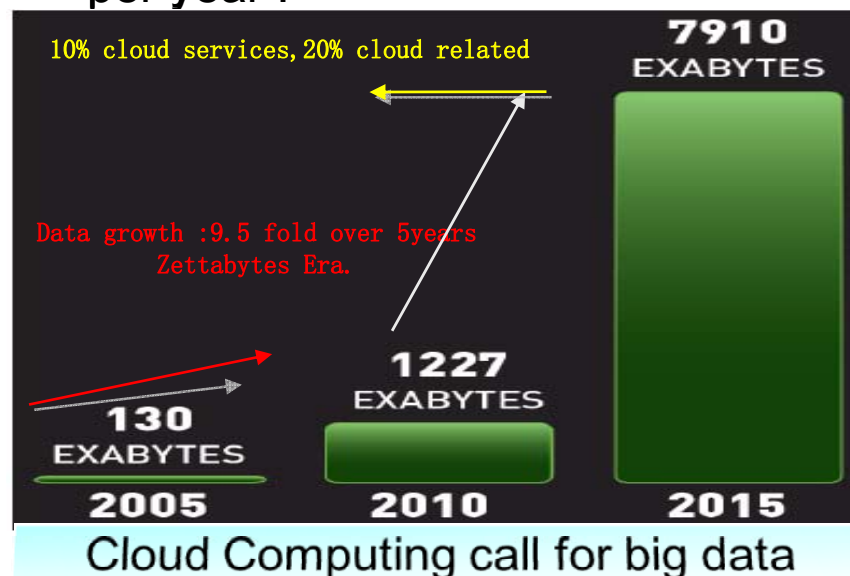


Rapid growth of global traffic



Key applications of Network Traffic

- ◆ 2011~2016 global IP traffic will increase 4 times, with CAGR of 29% , video traffic account for 54% ;
- ◆ 2011~2016 mobile traffic growth is 18 folds, with CAGR of 78%.
- ◆ By 2016, global IP traffic will reach an annual run rate of 1.3 zettabytes per year .



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Trends of Broadband Service

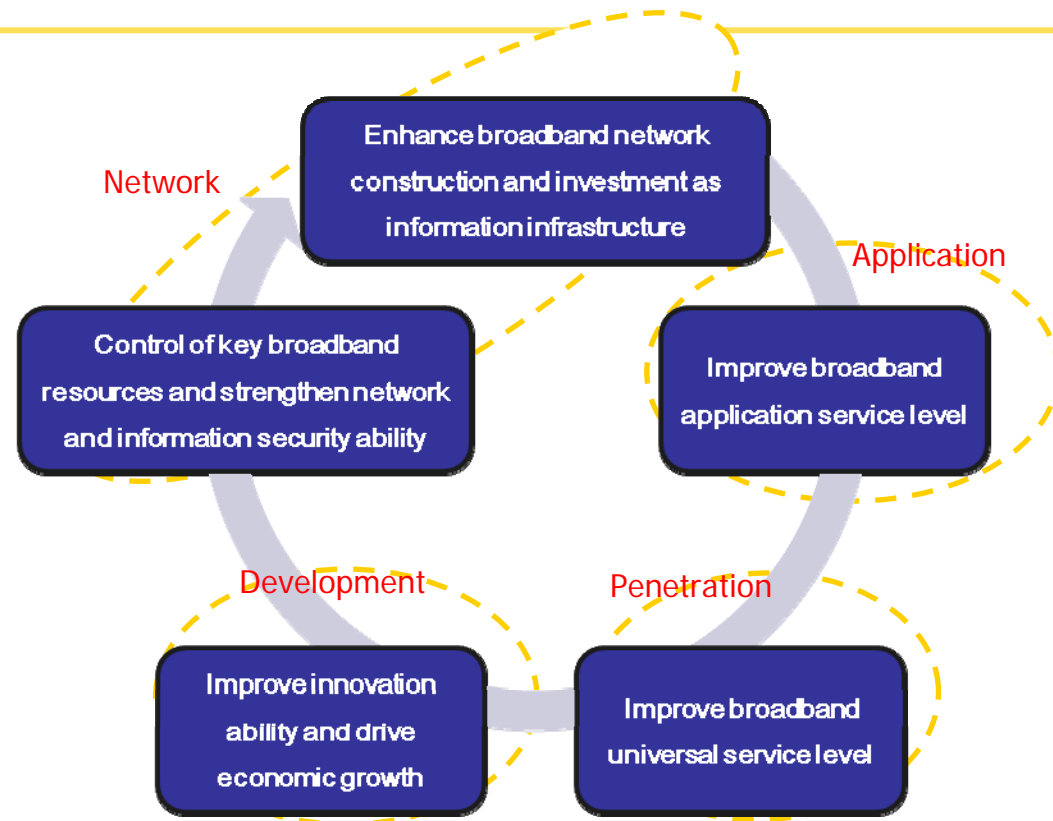
**Broadband Strategy of China**

Broadband Network Status & Trends

# Broadband Plan of Various Countries Globally

Broadband strategic status is improving. Broadband is regarded as key infrastructure for national development. Broadband deployment is the key driver for global economic growth. According to the World Bank, 10% growth of broadband penetration rate will drive 1.4% growth of GDP.

- Until now, more than 110 countries have announced their broadband plan.
- Most of the developed countries have set 100Mbps as their broadband speed target for 2020.

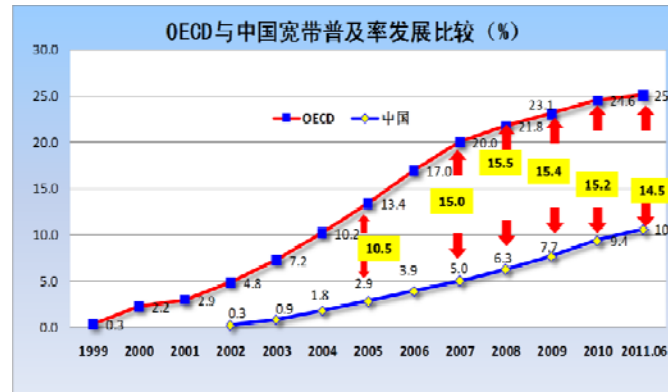


# Broadband Status in China

During the 11<sup>th</sup> 5-year Plan of China, 40% of the telecom investments were related to the broadband. For the 12<sup>th</sup> 5-Year Plan of China, 80% of that will be on broadband.

## Low penetration level

The broadband user 0.16 billion, penetration rate 11.7% (global average rate 8%). But far behind OECD countries.



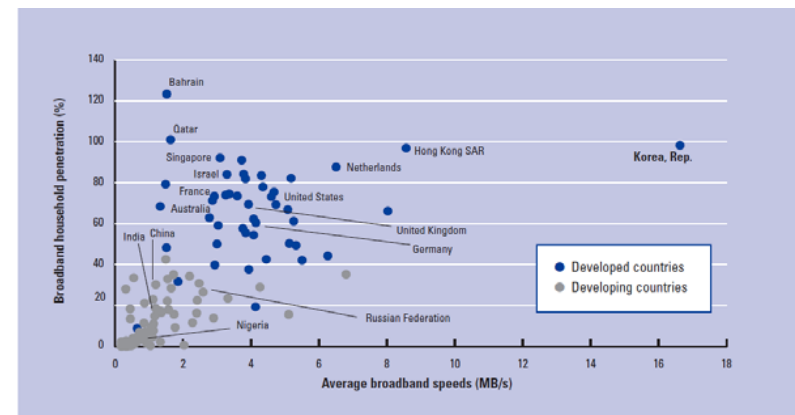
## Unbalanced development

Penetration rate differences of East & west region, urban & rural area are still large.

**High Price** The broadband relative price is still high compared with the economic development level.

	宽带价格 绝对值排 名 (从低 到高)	宽带价格占 月人均GNI 排名 (从低 到高)
165个经济体	36	91
人均GNI在3000- 5000美元的25个 经济体 (中国: 3650美元)	7	10

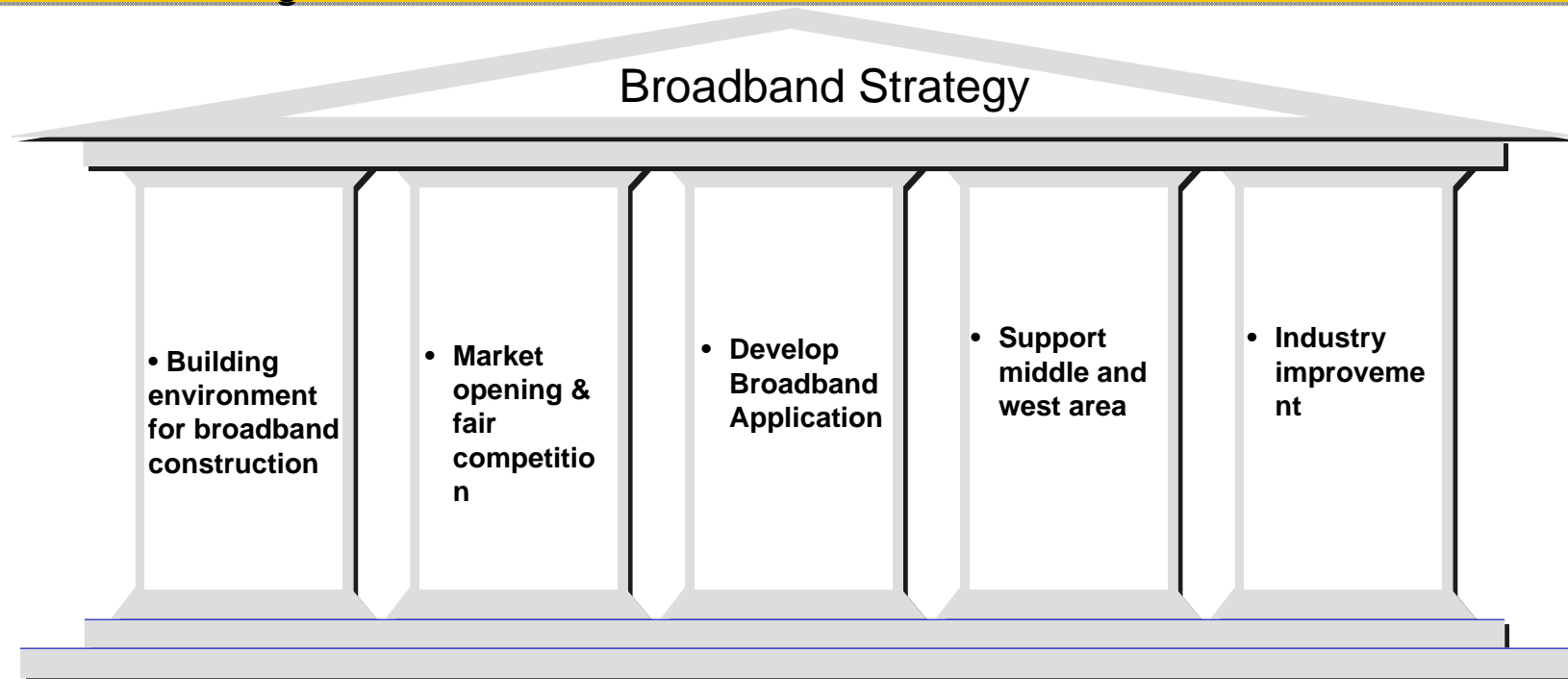
**Low network speed** 2Mbps average access speed far behind 20Mbps of OECD countries.



# China Broadband Strategy under Design

From February 2012, Chinese government has started to design broadband strategy of China (target 2013~2020).

Strengthen broadband development from various perspectives, including market environment, network construction, financial and taxes, industry, etc., under the guidance of the government.



**Broadband Strategy will greatly accelerate network deployment and broadband application in China.**

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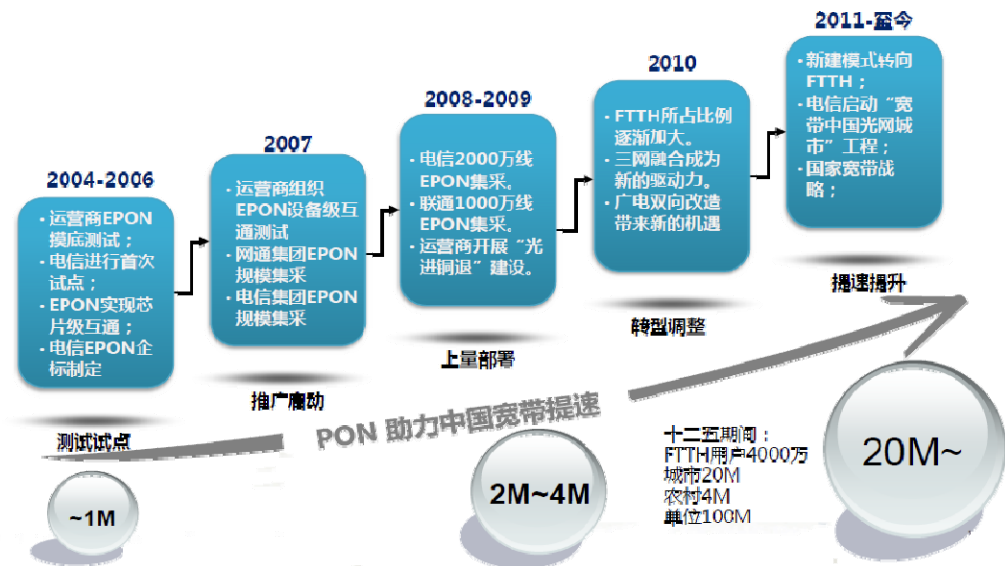
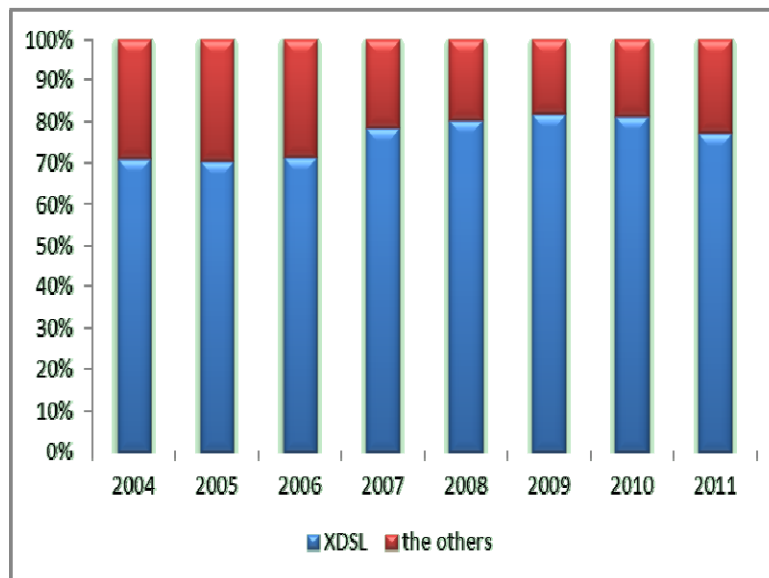
Broadband Strategy of China

**Broadband Network Status & Trends**



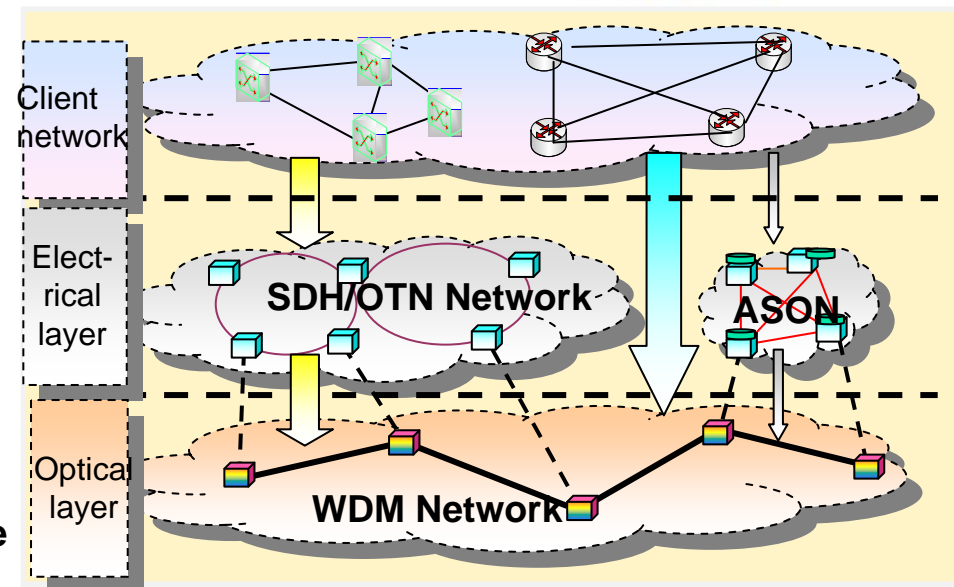
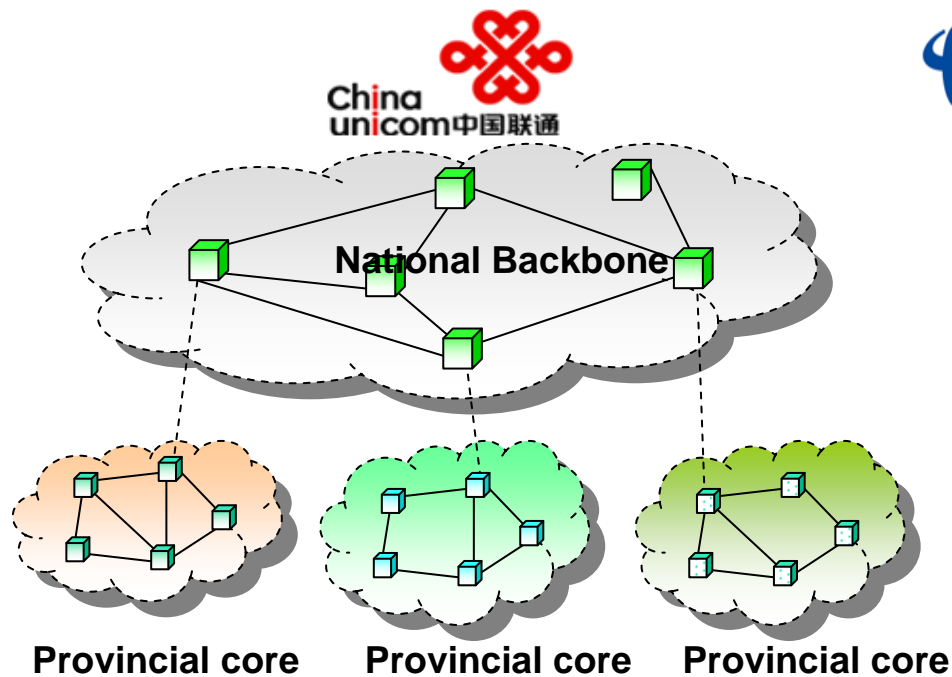
# Access Network Status

xDSL is still main access method( 80%), and become the largest DSL user group. The FTTx deployment before 2010 is mainly FTTB. With the reduced equipment price and the bandwidth requirement increase, carriers mainly adopt FTTH after 2010.



EPON/GPON is the main technology for FTTx. The trend to use GPON for FTTx is increasing. 10GPON equipment is mature, and carriers are building experiment networks with 10GPON to improve the access speed. ODN network construction and maintenance is the key problem to be solved.

# Core Network Status-Optical Transport Network

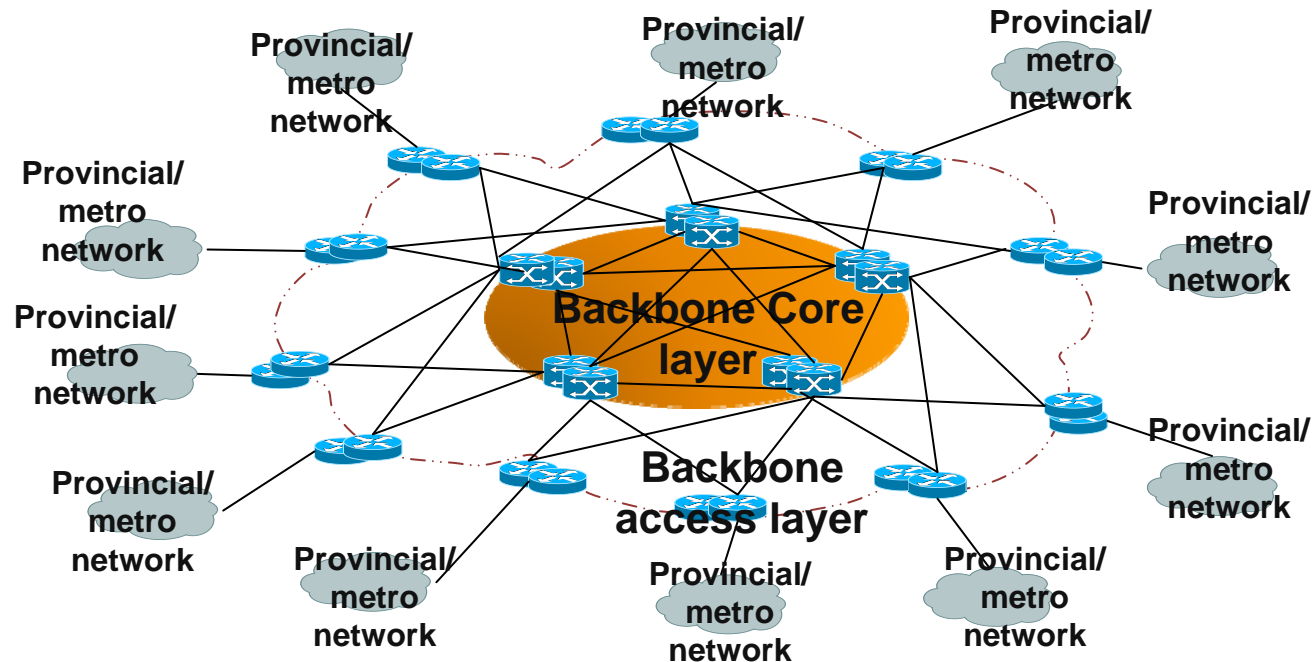


Network structure : Dense mesh network structure. Most provincial city has more than 3 physical outgoing directions. Some province has built two backbone nodes to enhance network resilience.

Technology : SDH,WDM, partially ASON and OTN. 80×40 Gb/s WDM systems were widely deployed, 100G WDM /OTN are under experiment.

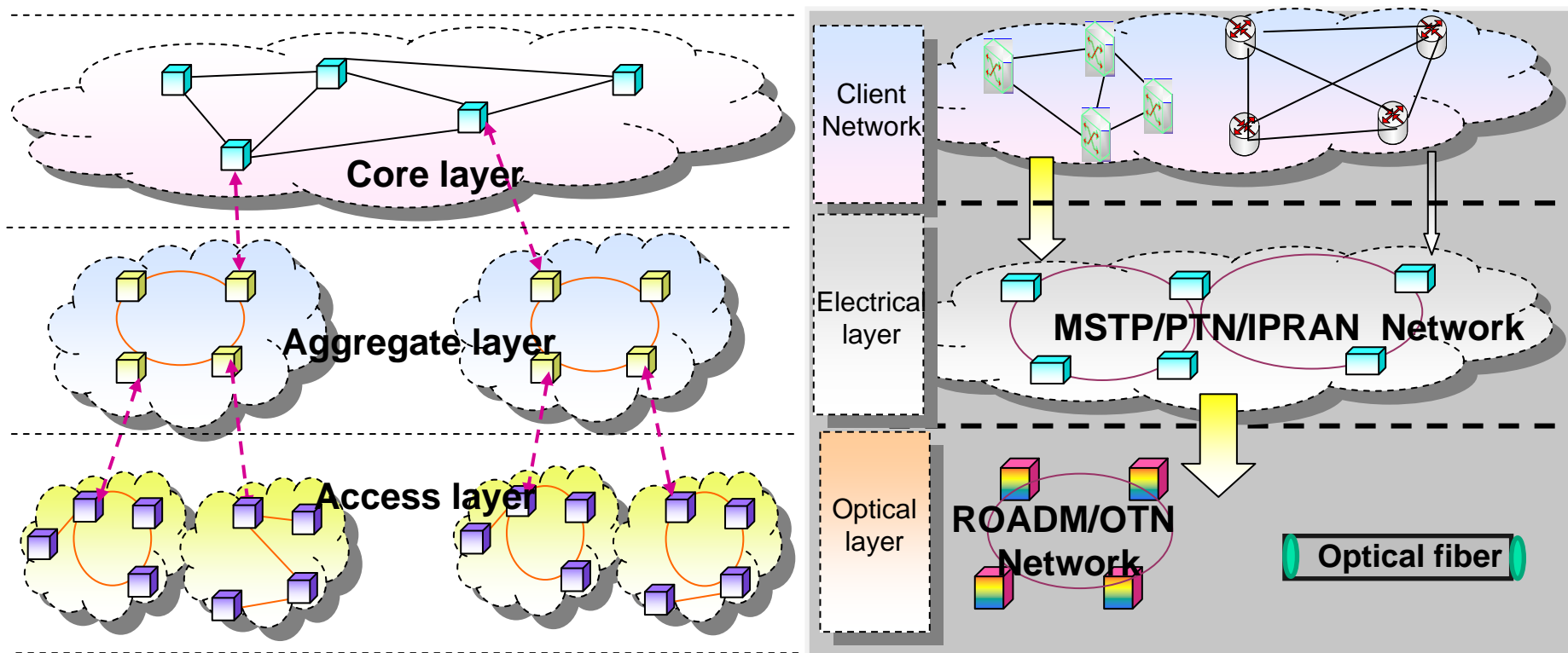
Services : soft switch network, Internet, high quality IP carrying network, leased line. IP over WDM with & without protection.

# Core Network Status- IP core Network



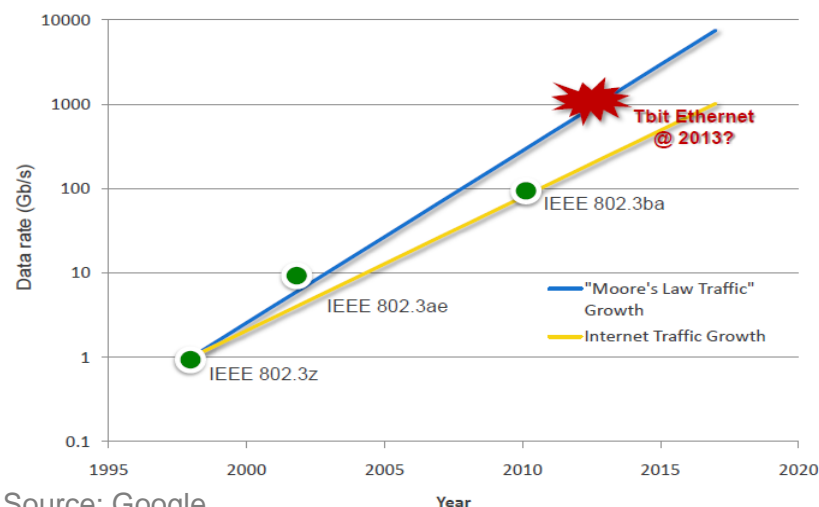
- IP backbone includes backbone core and backbone access layers. Backbone core nodes located in major developed cities. Backbone core and access nodes both contain two service routers and core routers. Backbone access nodes connect with backbone core nodes using dual-homing or multi-homing methods.
- National backbone bandwidth 40Tbps. Interconnection links are mainly 10G/40G, and are migrating to 100Gbps.

# Metro Network Status



- Mainly adopt MSTP and PTN for 2G/3G backhauling and data leased line services. Migrating to PTN/IP RAN and adds layer 3 functions to support LTE backhauling.
- Aggregate and access layer migrate from GE/10GE ring to 10GE/40GE ring. Metro core introduces OTN/POTN to expand capacity.

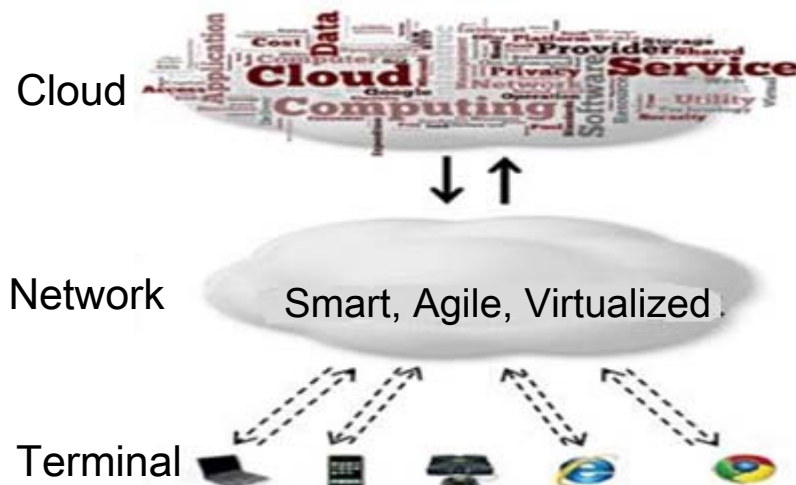
# Challenges of Broadband Network



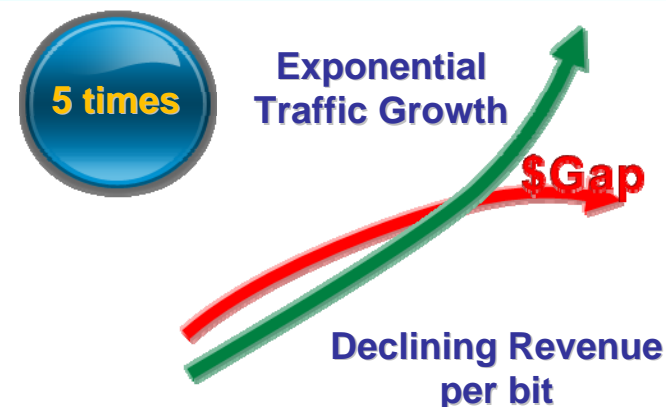
Traffic growth drive for high speed network



Vedio services needs high performance



Cloud computing challenges network



Source: Cisco VNI Global Forecast, 2011–2016

Traffic & revenue growth diff Increases

# Cloud Computing Influences Data Centers

Large scale and centralized data centers become the trends.

	Middle DC cost	Large DC cost
Network	\$95 Mb/sec/month	\$13 Mb/sec/month
Storage	\$2.20 GB/month	\$0.40 GB/month
Management	Each administrator manage 140 servers	Each administrator manage 1000 servers

- Large scale cloud data center has obvious cost benefits, become the main adoption for newly built data centers.
- By now, 13 provinces of China have planned 30 large scale data centers with more than 100 thousand servers.

Large data center migrate to resource and climate appropriate regions

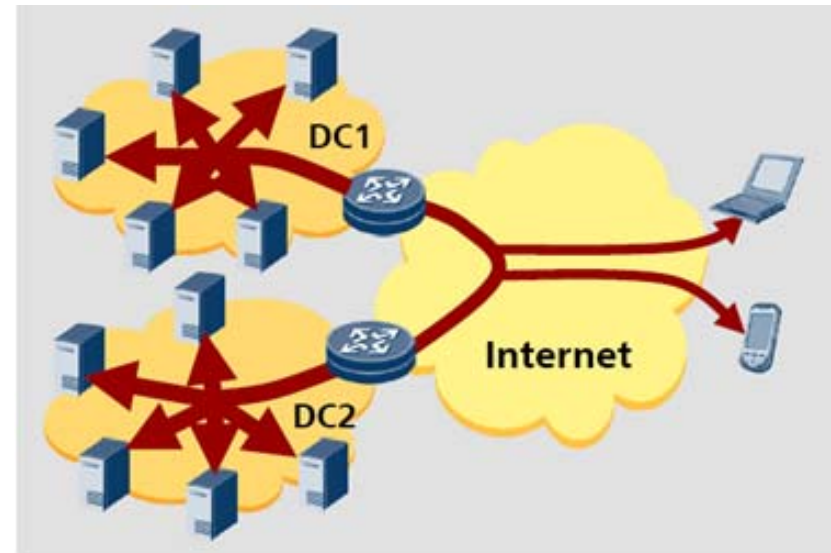
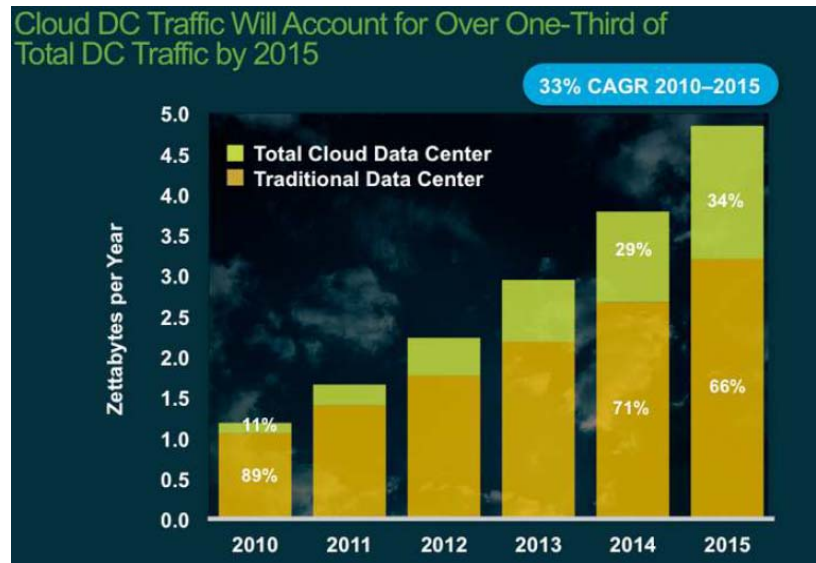
- Large scale data centers select climate, power and geographic appropriate regions to reduce OPEX.
- Newly planned data centers migrate from east developed region to west and north resource abundant regions, from first class cities to second class cities.





# Cloud Data Center's Influence to Network

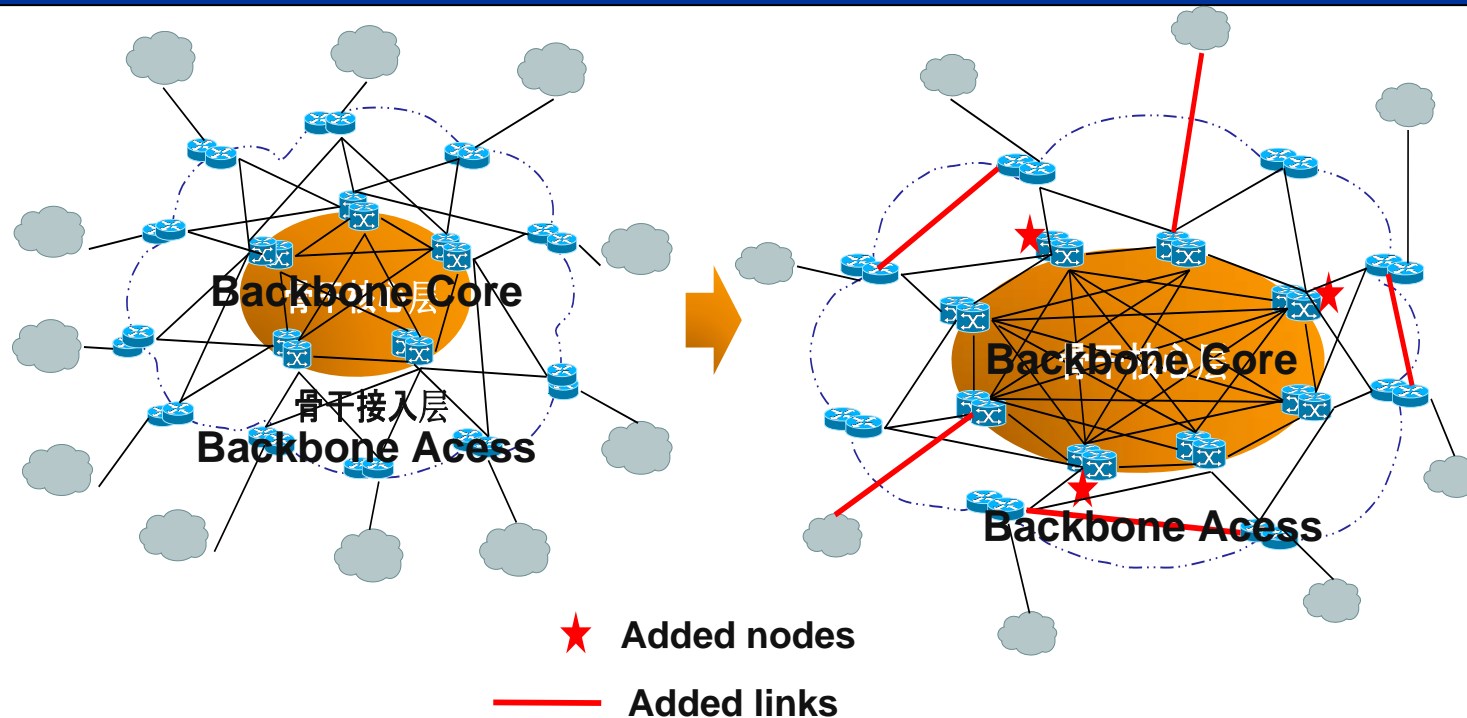
Cloud computing changes traffic amount & pattern dramatically



全球数据中心流量增长预测 来源: Cisco: Cloud Index White Paper

- 2010~2015, global data center IP traffic increases 4 times.
- From 2010-2015, data center traffic growth will be 7~10 folds.
- Network traffic changes from mainly north-south to mainly east-west, and required low latency and large layer 2 network construction.

# Network Structure Optimization



- To response to the rapid traffic growth, response to the frequent network upgrade and expansion, the IP national backbone network structure will migrate to flattened network.
  - Some backbone access nodes upgrade to backbone core nodes, core nodes interconnected in full mesh.
  - Add inter-province direct links to reduce transit traffic.
- To support data center deployment, more cables and transmission systems need to be built in west and north region of China



# High Speed and Large Capacity Network Deployment



CERNET

- Maximum link capacity 12T, node capacity 55T.
- begin 100G WDM and router testing and field trial 2011~2012. CERNET first 100G WDM deployment.
- Carriers plan to deploy OTN switches in national backbone to facilitate provisioning and improve reliability.



100Gbps deployment progress



Technology Improvement

Test & verification

Commercial Experiment

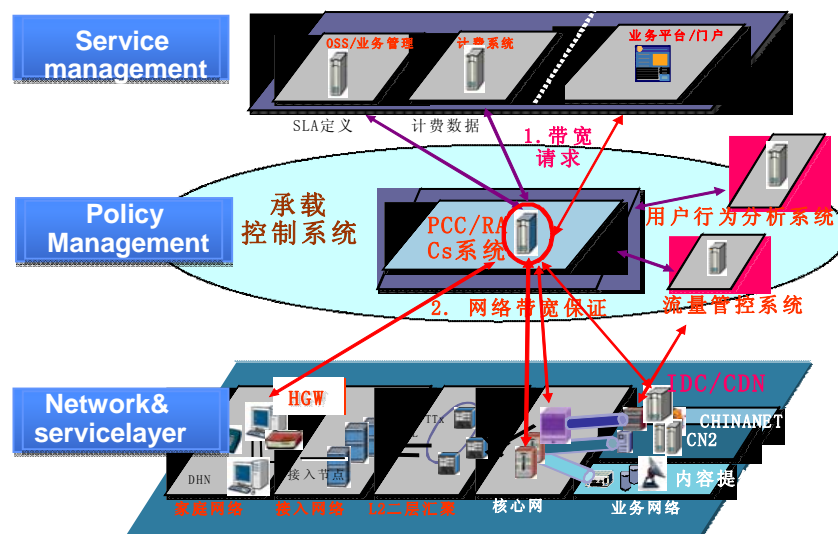
Comercial Deployment

Large scale deployment

# Network Intelligence Development

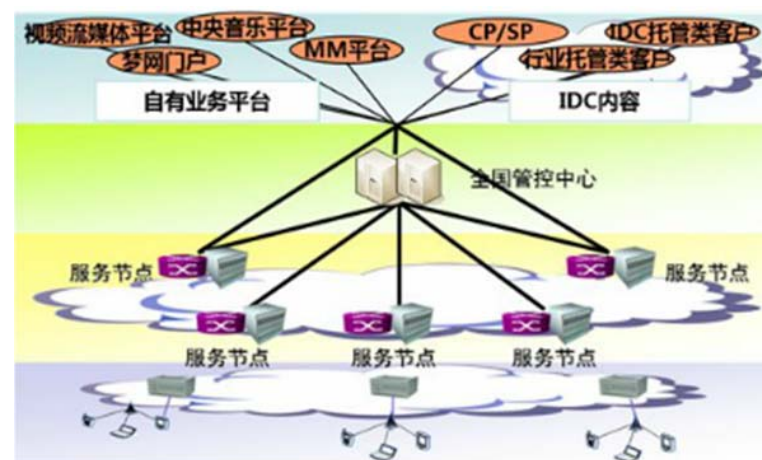
## Smart Pipe

- Deploy smart pipe to cope with the large traffic.
- Add service aware network elements and provide different resources for different services, to improve network performance and the value of the pipes.



## Content Distribution Network

- More than 60% traffic are video; 90% traffic are from 10% website.
- Cause network congestion, low response time and duplicated traffic transport.
- Full service CDN and cloud CDN need to be deployed to reduce the backbone traffic, and provide on demand services.



# Conclusion

- Broadband development is regarded as key infrastructure around the world and has been brought up to the national strategy level.
- China is now designing it's broadband strategy and will greatly accelerate network deployment and broadband application in China.
- Rapid growth of global broadband traffic and emerging services such as cloud computing are has putting new requirements to the broadband network and drive for new network infrastructures.
- IP core network flattening, 100Gbps high speed DWDM and large capacity OTN deployment, cloud data center interconnection, smart pipe and CDN will be the trends for broadband network in China.



工业和信息化部电信研究院

China Academy of Telecommunication Research (CART)

**Thank You for  
Your Attention!**

