China Research Activities & Plans on Optical Networking

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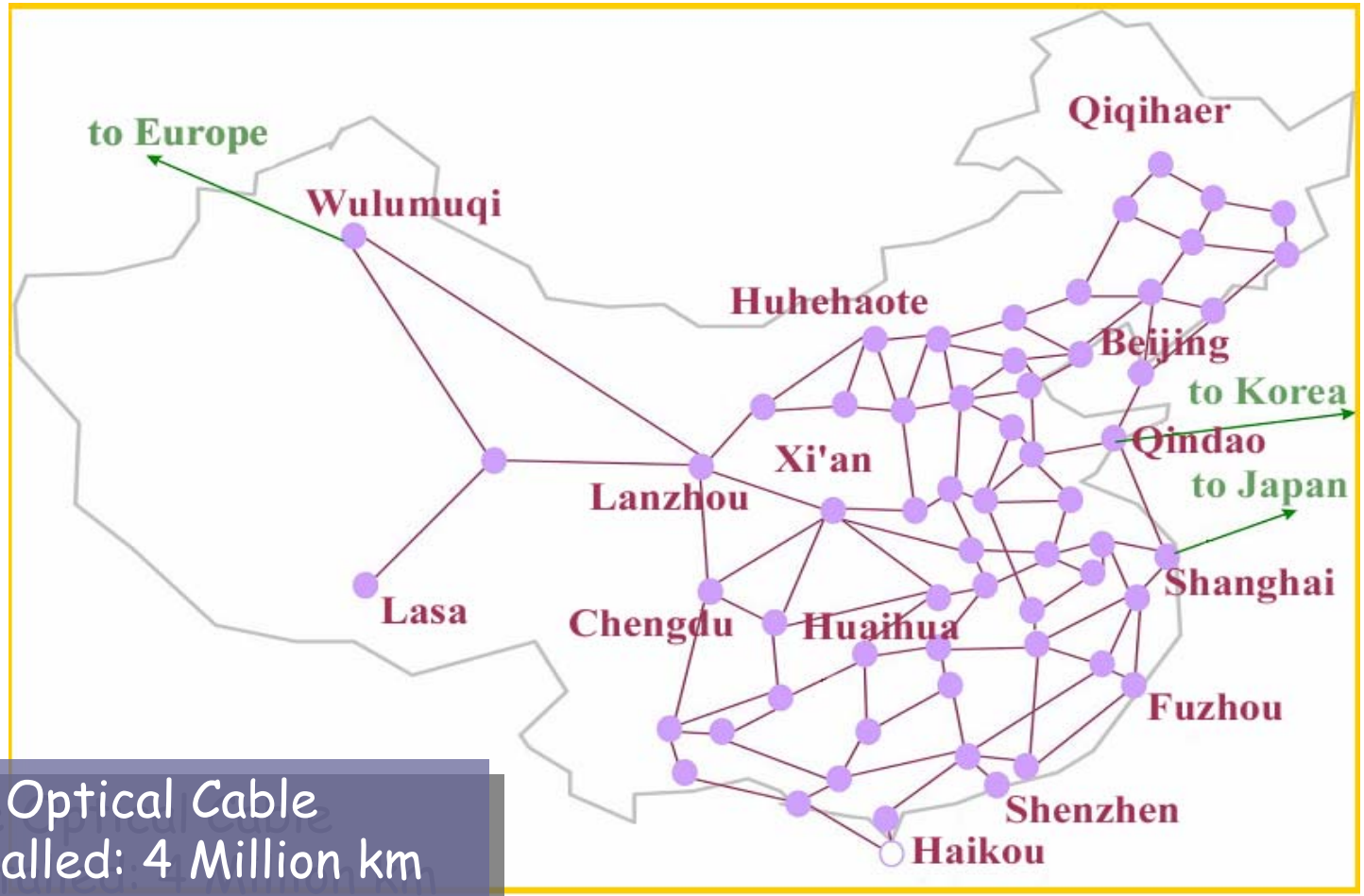
Outline

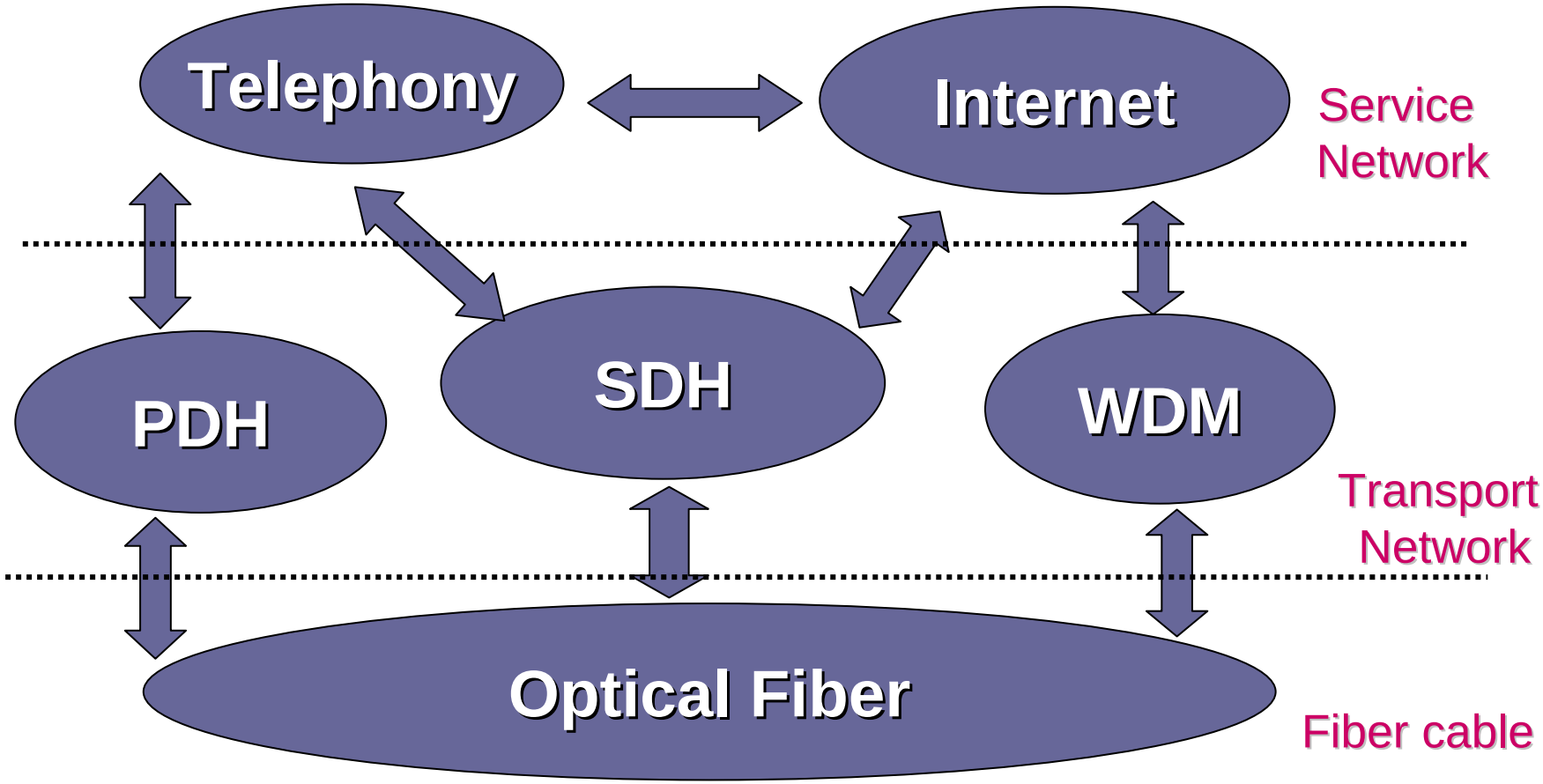
- Status of Optical Network in China
- Research Networks for Next Generation Network in China
- Next Generation Optical Network and Services
- Conclusions

Optical Network in China(mainland)



The Optical Cable Installed: 4 Million km

Technologies in Current Telecommunication Network



Backbone Transport Network

- WDM Network and SDH Network
- Long Haul: 80/160×10Gb/s DWDM
- Regional Network: 40×10Gb/s DWDM
- Metro Network: 10Gb/s SDH Ring and 40×10Gb/s DWDM

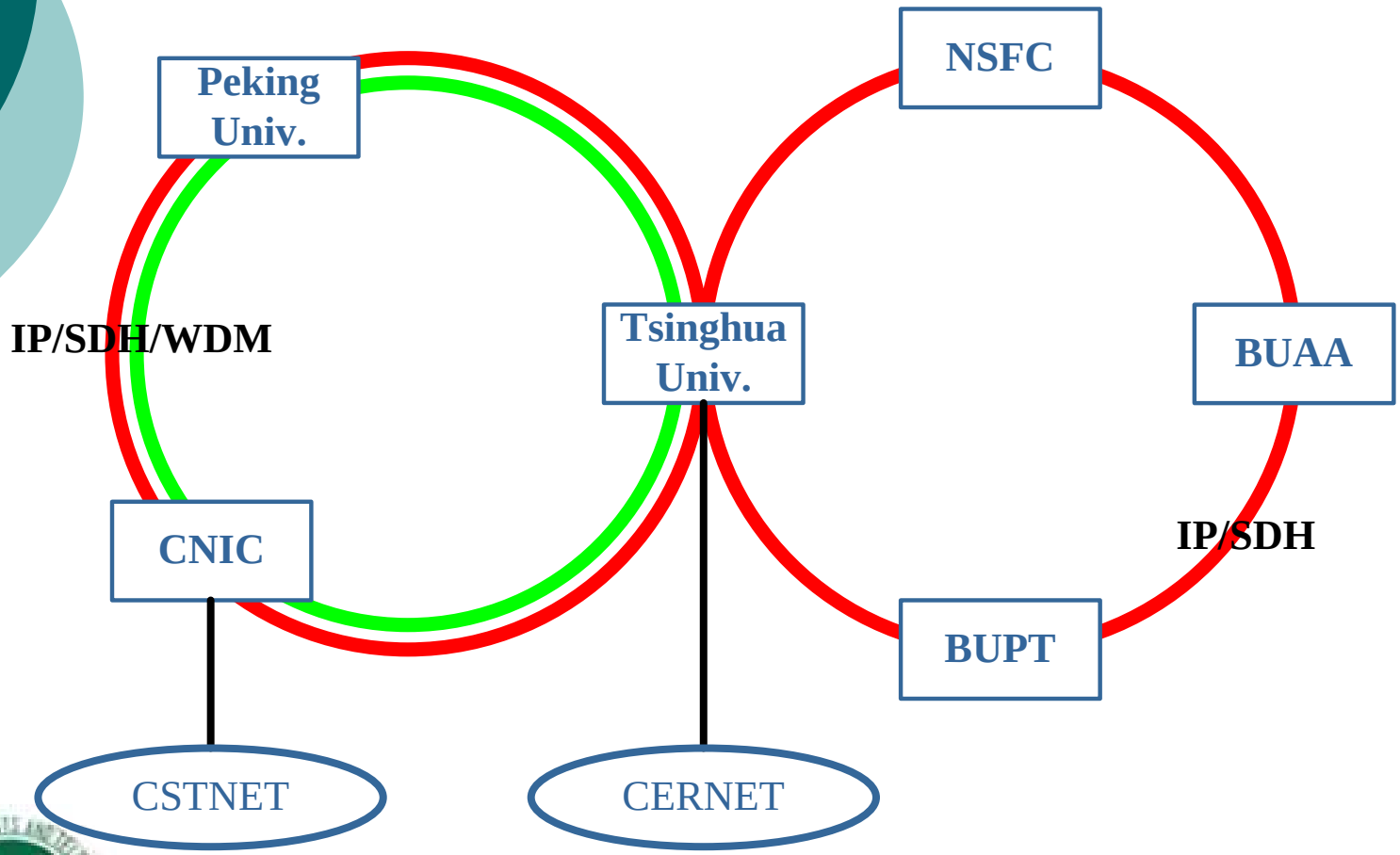
Data Network

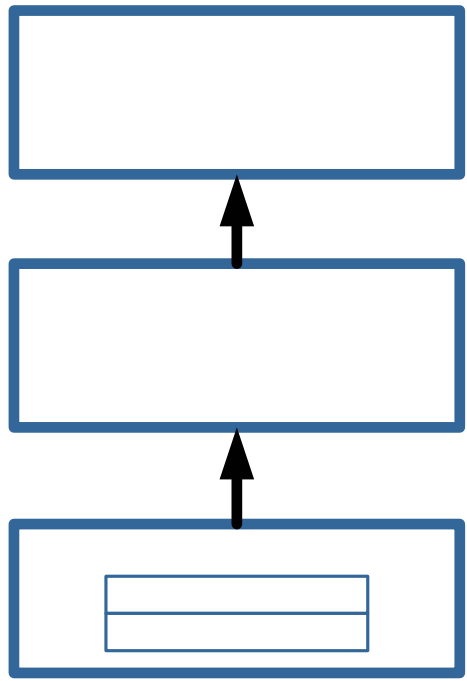
- IP over SDH/WDM and High Capacity Core Router
- Capacity of Core Router: 320～640Gbps
- Relay Bandwidth: N×2.5Gb/s and N×10Gb/s
- Architecture: Level 3 → Level 2

Research Networks for Next Generation Network

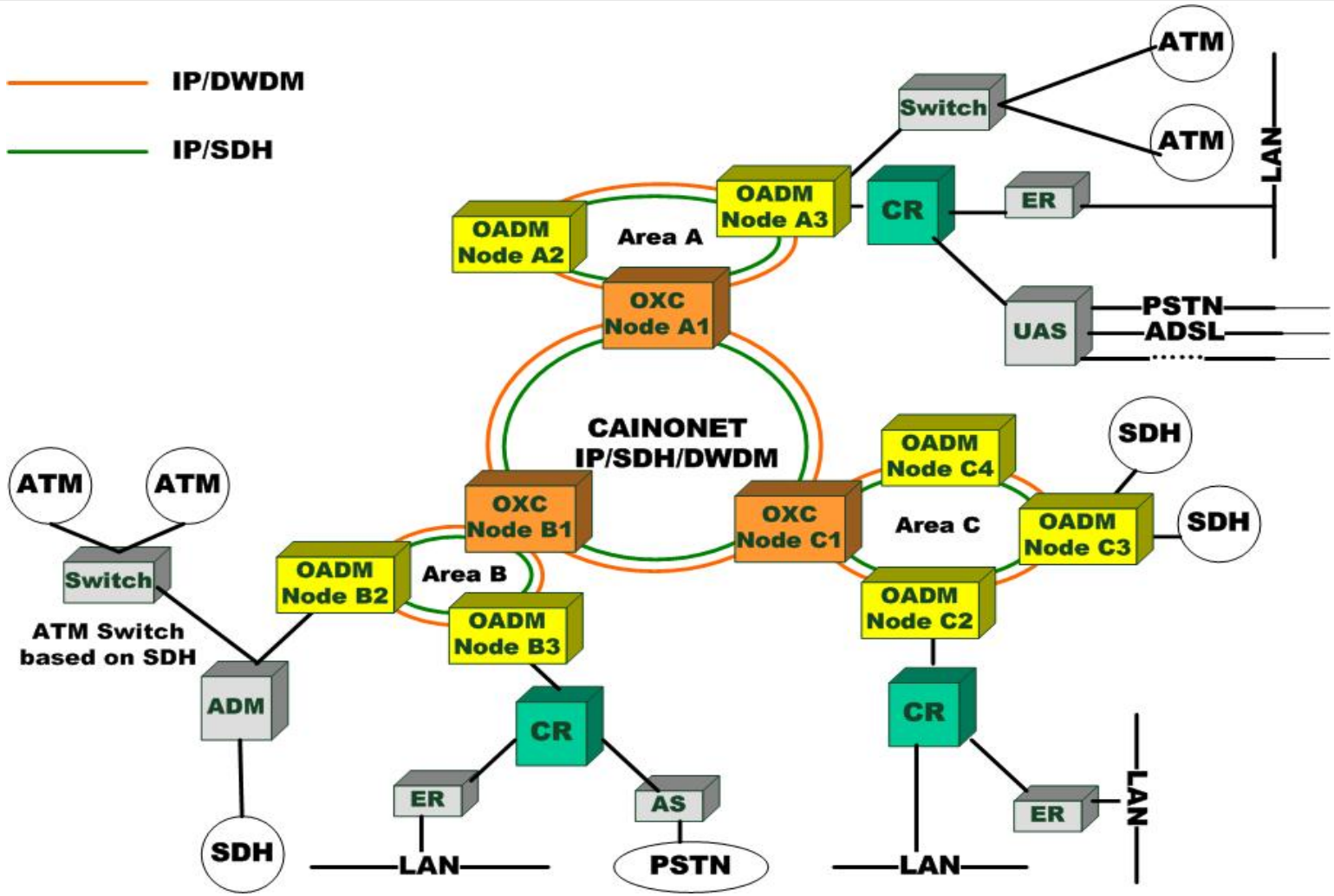
- ✓ **NSFCNET** supported by National Nature Science Foundation of China (NSFC)
- ✓ **CAINONET, 3TNET** supported by Ministry of Science and Technology of China (MOST)
- ✓ **CERNET2** supported by Ministry of Education (MOE)
- ✓ **CNGI** supported by National Development and Reform Commission of China (NDRC)

NSFCNET

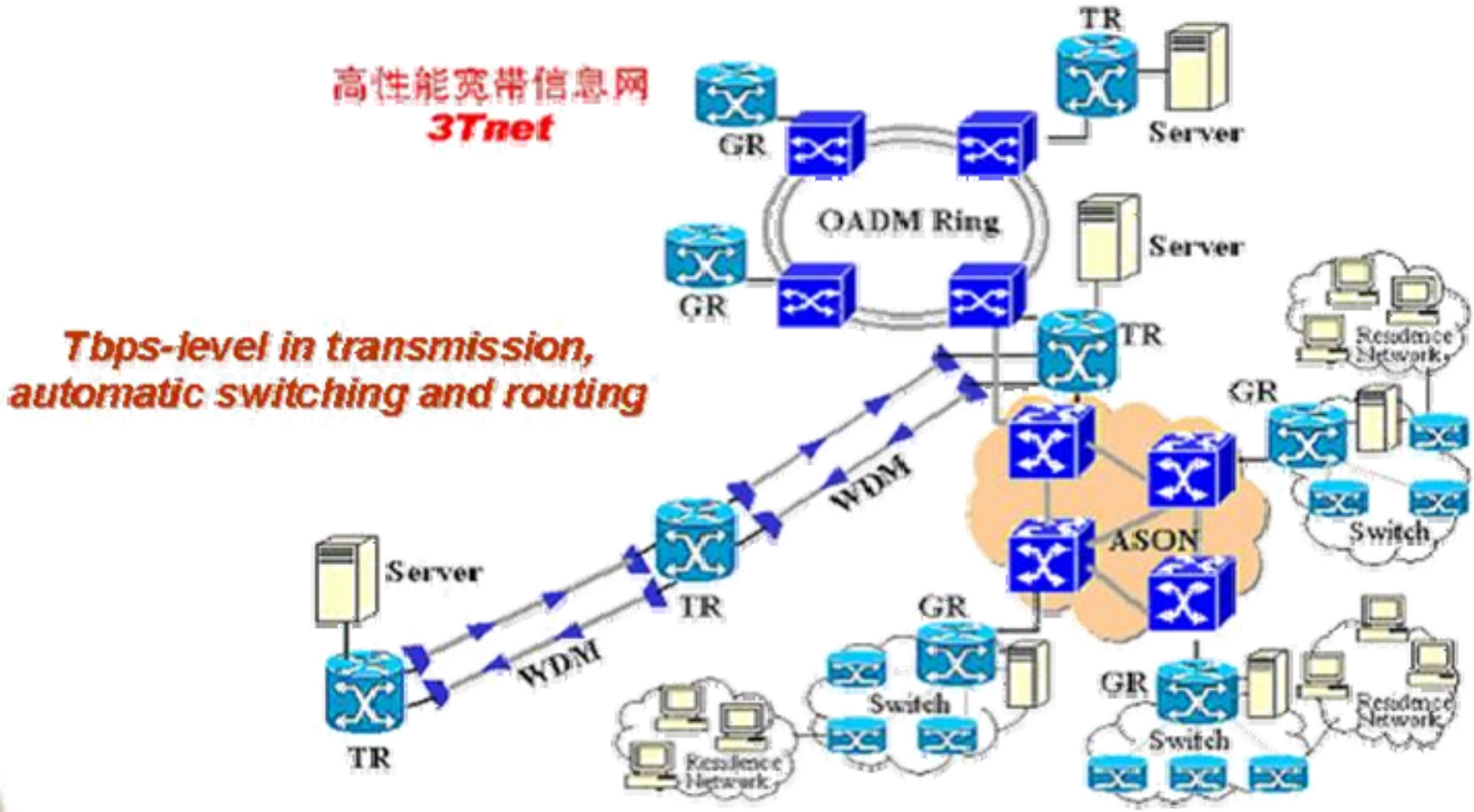

Peking Univ.
NSFC
IP/SDH/WDM
Tsinghua Univ.
BUAA
CNIC
IP/SDH
BUPT
CSTNET
CERNET



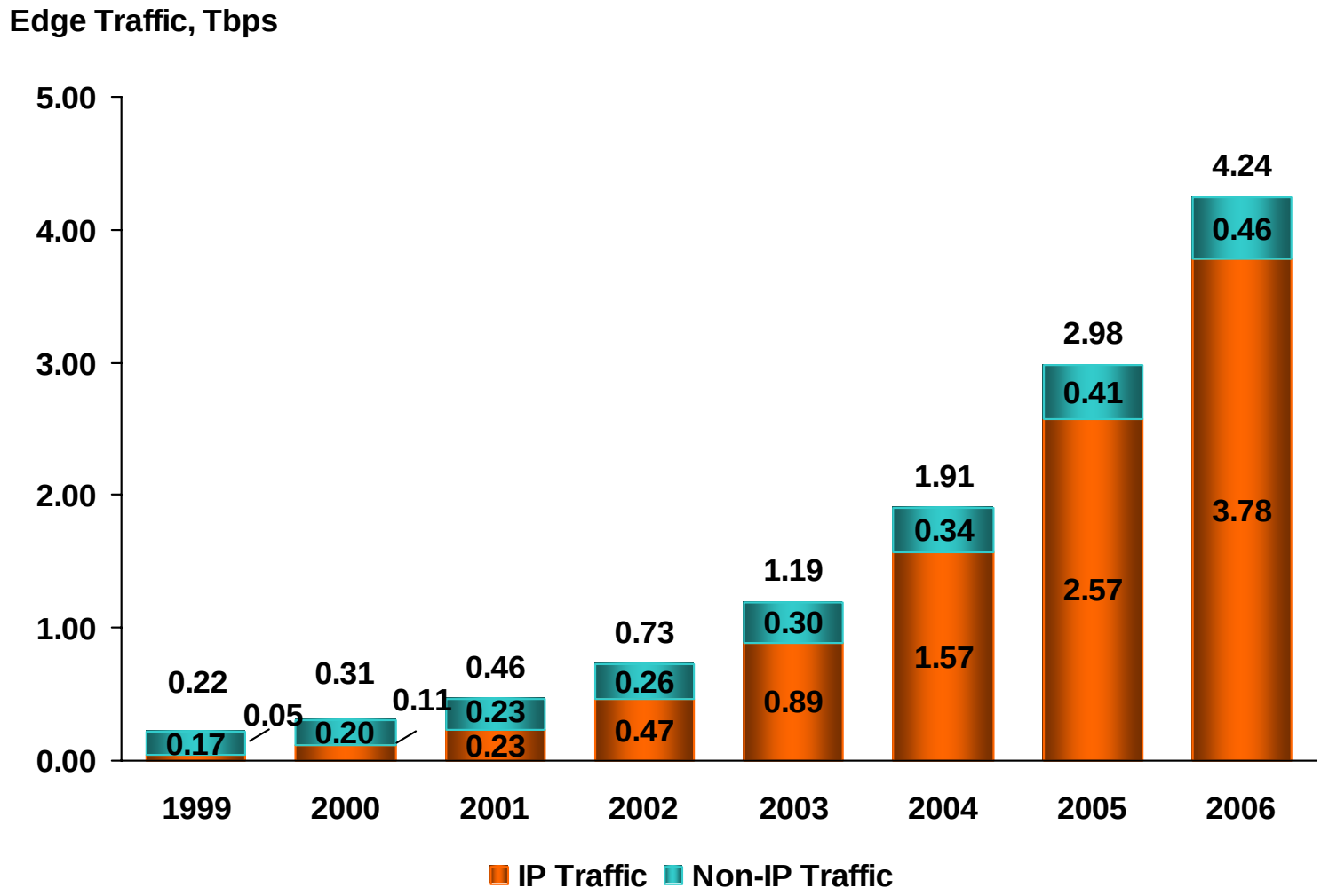
CAINONET


IP/DWDM
IP/SDH
ATM
ATM
Switch
LAN
OADM Node A3
CR
ER
OADM Node A2
Area A
OXC Node A1
UAS
PSTN
ADSL
CAINONET IP/SDH/DWDM
SDH
OADM Node C4
ATM
ATM
OXC Node B1
OXC Node C1
Area C
OADM Node C3
SDH
Switch
OADM Node B2
Area B
OADM Node C2
ATM Switch based on SDH
OADM Node B3
ADM
CR
CR
ER
AS
ER
LAN
SDH
LAN
PSTN
LAN

3TNET

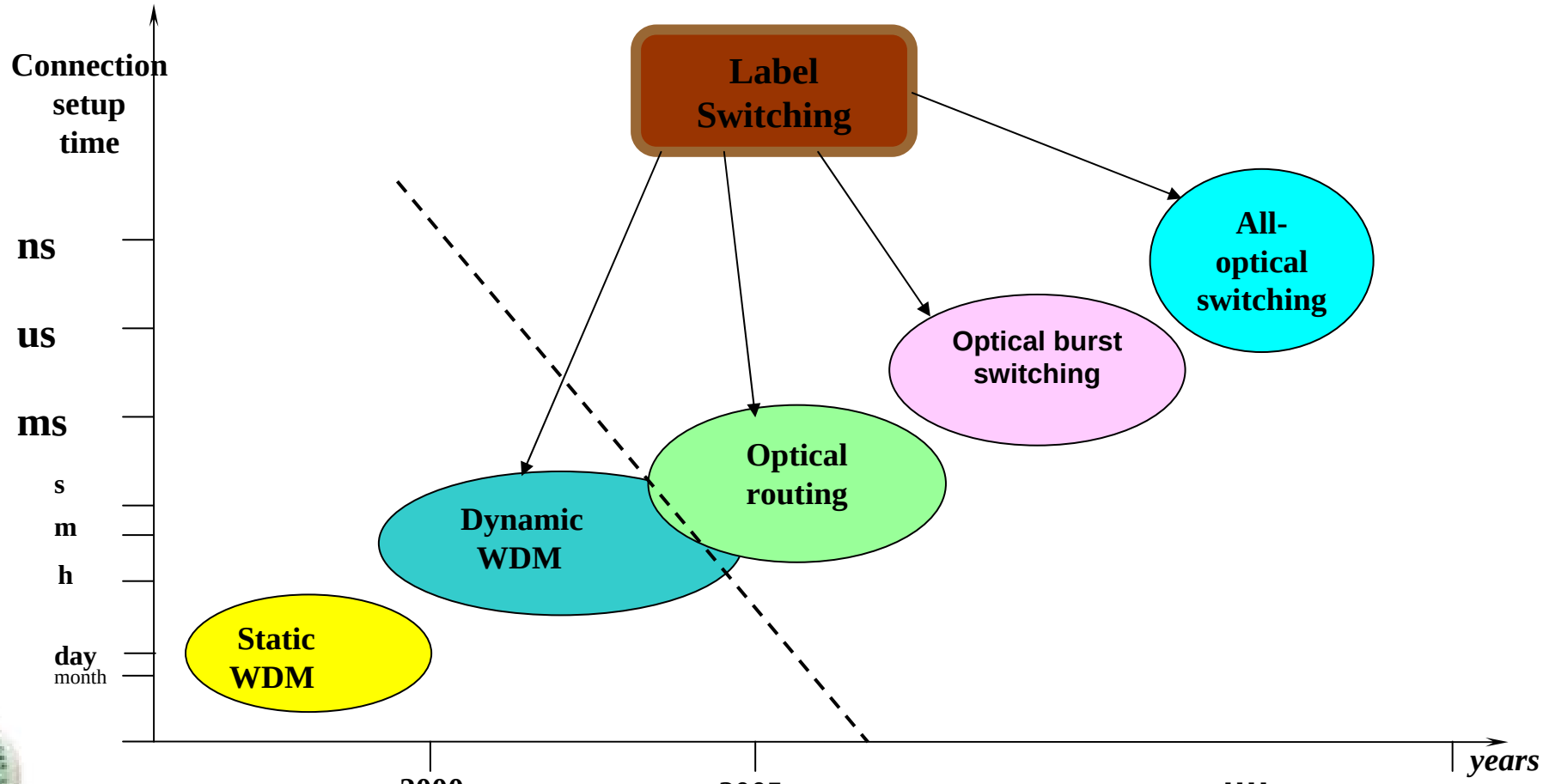

高性能宽带信息网
3Tnet
Tbps-level in transmission, automatic switching and routing
TR
Server
GR
OADM Ring
Server
GR
TR
Residence Network
GR
Switch
ASON
WDM
WDM
Server
TR
TR
GR
Switch
GR
Switch
Residence Network
Residence Network

Actual & Forecast Bandwidth Demand

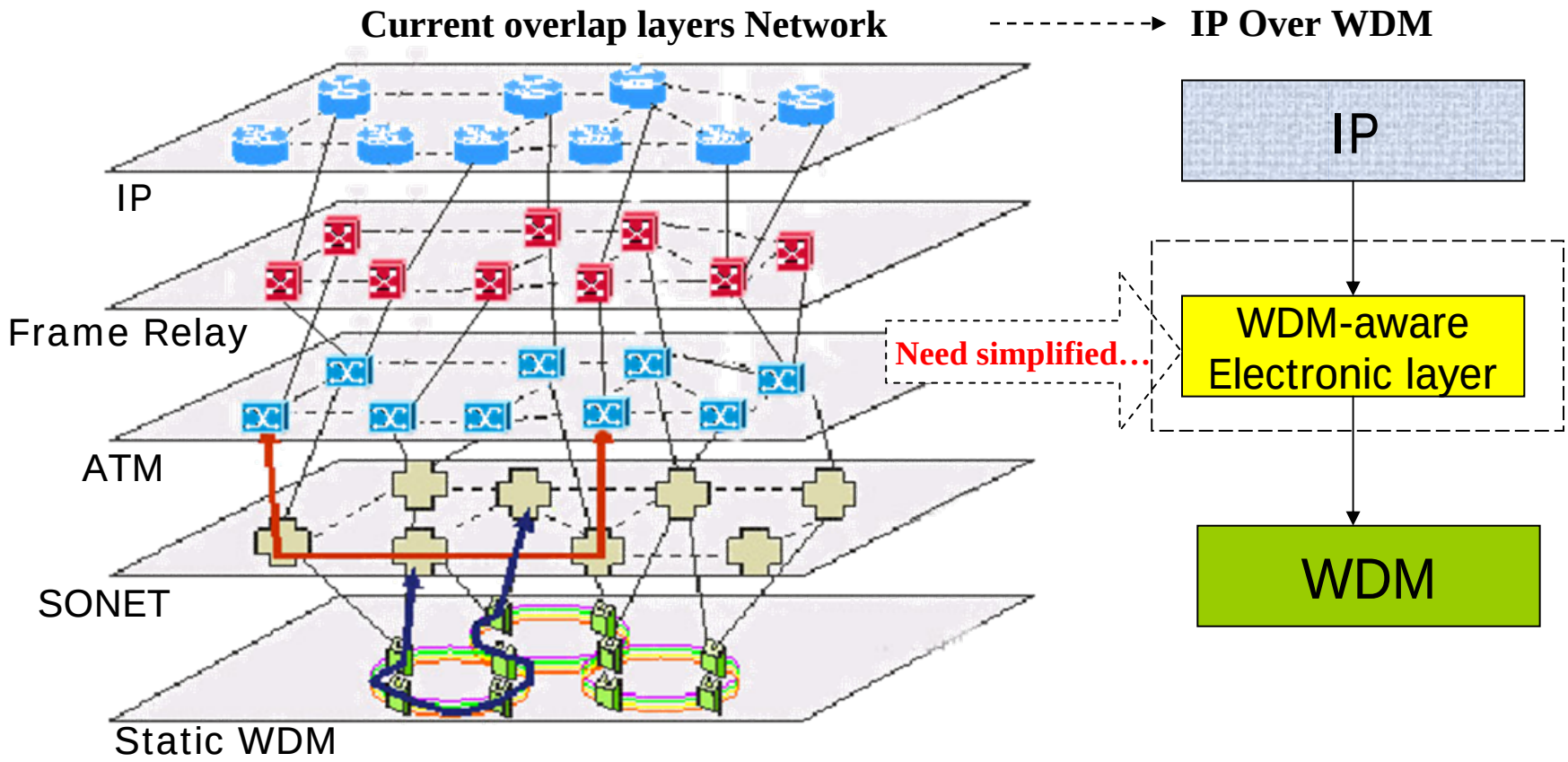


Trends of Optical Network Evolution

Optical transport networks → Intelligent optical networks→ All-optical networks



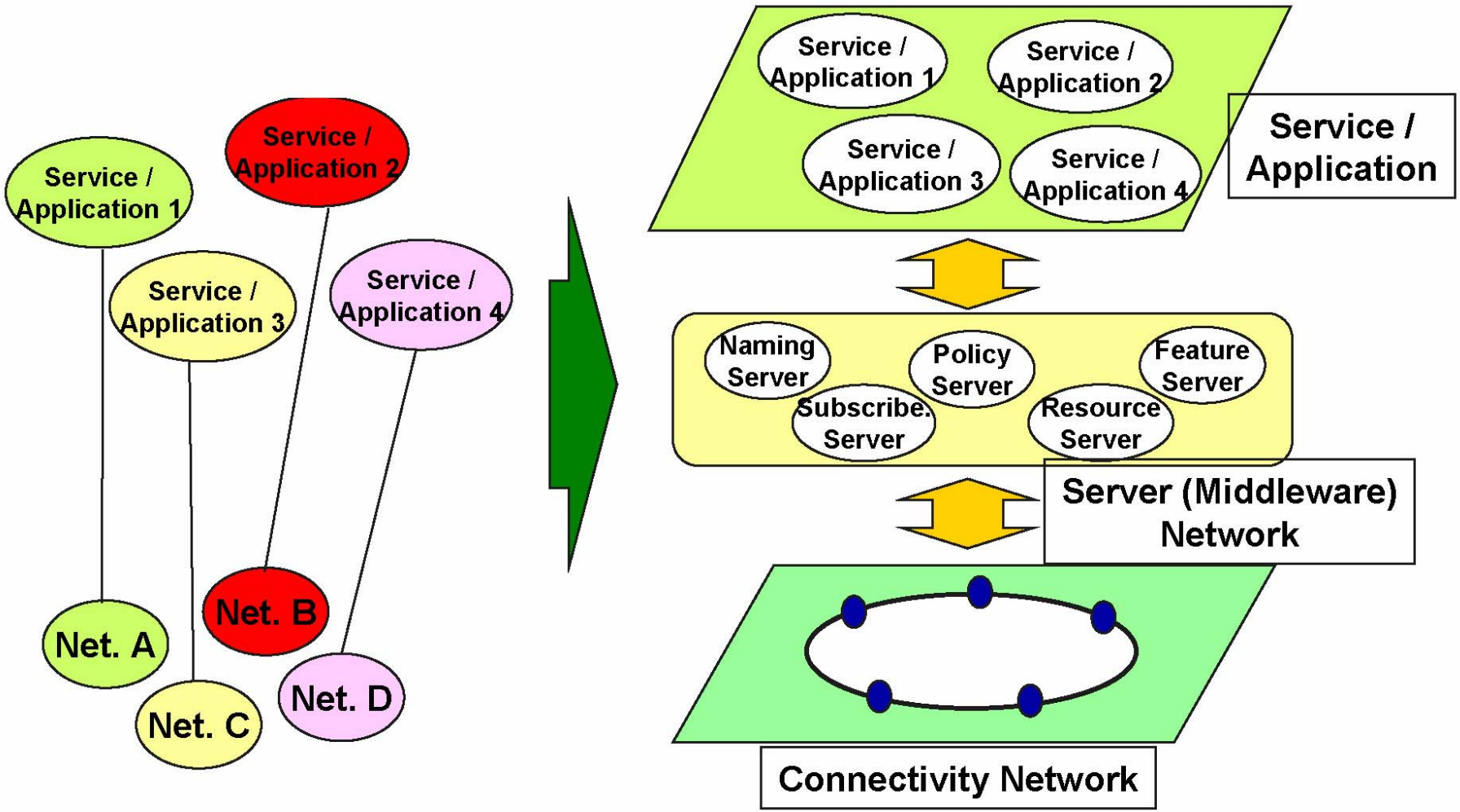
Network Architecture Evolution



Current Typical Broadband Networks Structure

Simplified Networks Structure

Services Model Evolution



Next Generation Optical Network and Services

- ✓ **Features**
  Service-oriented, Flexibility, Dynamic, Scalability, End to End Qos, Mobility, More Efficiency, …
- ✓ **IP Based Services**
  Stream Media (IPTV, Online game, VOD, Video Conference, e-learning,…), Voice, SAN, …
- ✓ **Creative Technologies, Creative Architecture for Various New Services**

Current Viewpoint for Next Generation Optical Network

- ✓ Next Development Step for Optical Network need comprehensive and thoughtful investigation
- ✓ National 11th 5-year Research Plan are under discussion
- ✓ Some Initial Research Activities & Plans are Launched last year

Architecture of Dynamic, Flexibility Optical Network

- ✓ Service-oriented Application Environment
- ✓ Dynamic, Flexibility Architecture for Optical Network
- ✓ Controllable and manageable Resource Allocation Mechanism
- ✓ Middleware
- ✓ Qos Issue in Optical Network

Photonic Grid

- ✓ Architecture for Photonic Grid, …
- ✓ Control Mechanism, Signaling Protocol, Routing Technology, …
- ✓ Resource Allocation and Self Organized, …
- ✓ MPLS Control Plane
- ✓ Grid Interface, …

Optical Switching and Interconnecting

- ✓ Optical Packet/Burst Switching
- ✓ Optical Performance Monitoring
- ✓ Optical Signal Processing
- ✓ Multicasting
- ✓ Tunable Components for Switching

Conclusions

- Extensive Study on Next Generation Optical Network and Services in China
- Collaboration Between Academy and Industry
- National 11th 5-year Research Plan will be launched soon

Thank You!

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