

IP Core Optimization

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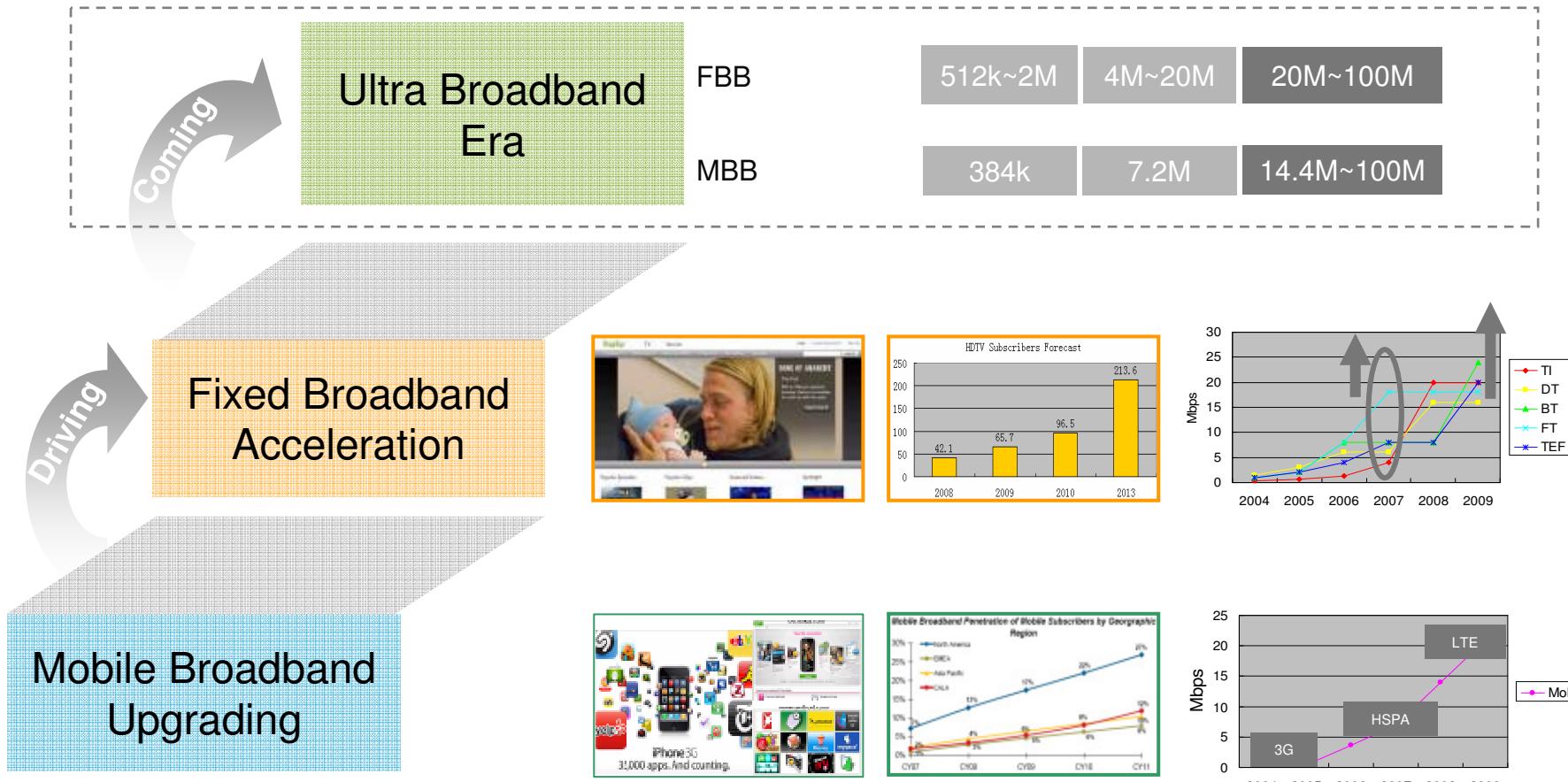
- Trends and Challenges
- Converged IP/MPLS Backbone
- Successful Stories



1 Trends & Challenges

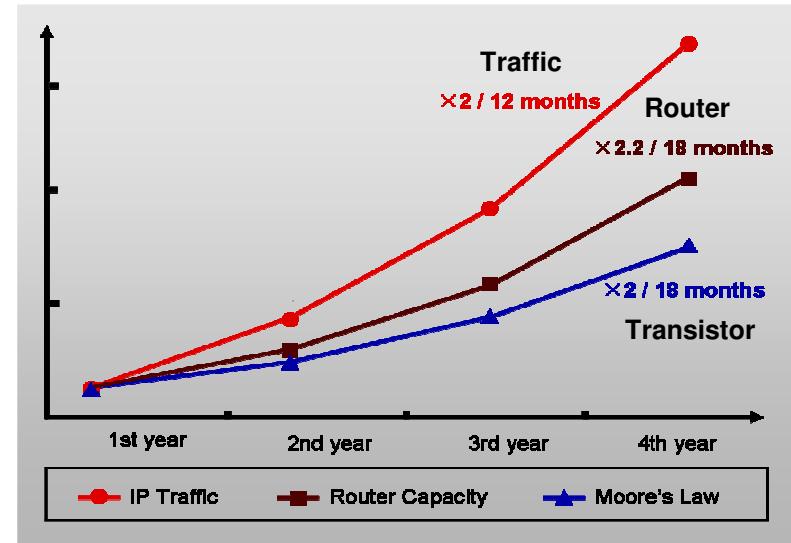
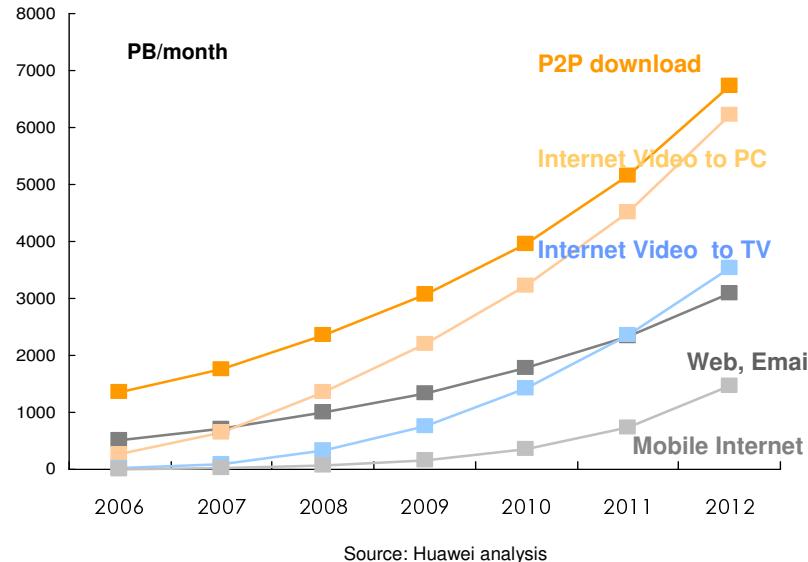
Ultra Broadband Era is coming

- Billions of subscribers, 20M~100M for each



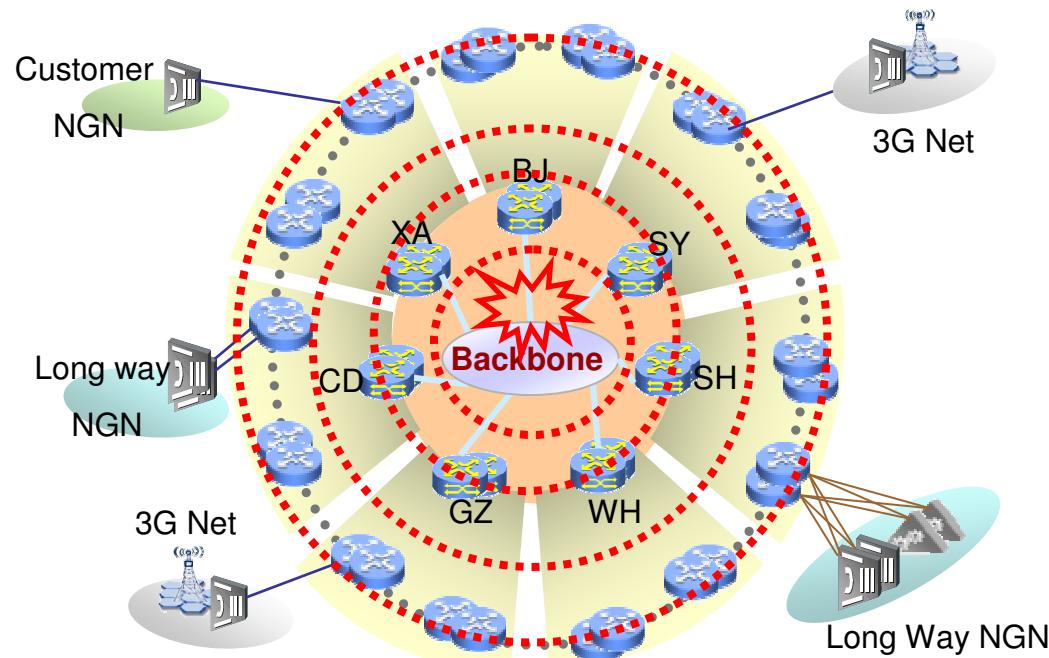
In the next three years, there will be **300 million fixed** broadband users and **1.2 billion mobile** broadband users added to the existing user base worldwide, 20M ~ 100M for each subscriber, big challenges

Endlessly Fast Increasing Traffic



- For many operators, the service traffic will grow 2 times per 12 month, the capacity of transistor and router can not go with this requirement. The network scalability is becoming one of the major challenges
- Besides increasing router capacity & scalability, approaches in a broader sense should be considered, like IP and optical synergy, IP and storage synergy (Cache & CDN), to improve network efficiency and reduce expansion pressure on core router**

Widespread Reliability Disaster



- Failures in backbone network have serious impact in terms of **subscriber's loyalty** and **economical loss**. In terms of reliability, real-time telecom services (like voice, managed VPN services) have much higher requirements than Internet service
- Backbone failures mainly come from system upgrades, software bugs, hardware failures, misoperation, etc. To enhance backbone reliability, multiple measures are necessary, including **equipment-level HA**, **network-level HA**, **cross-layer collaboration like IP&OTN synergy**, etc

How to Solve These Problems



Expansion
Bottleneck



Unreliable
Network



- 200T Cluster
 - 40G & 100G port
 - Offloading
- ISHE & ISSU, NSR
 - e2e 200ms Switch-over
 - SRLG



Huawei Converged IP/MPLS Backbone

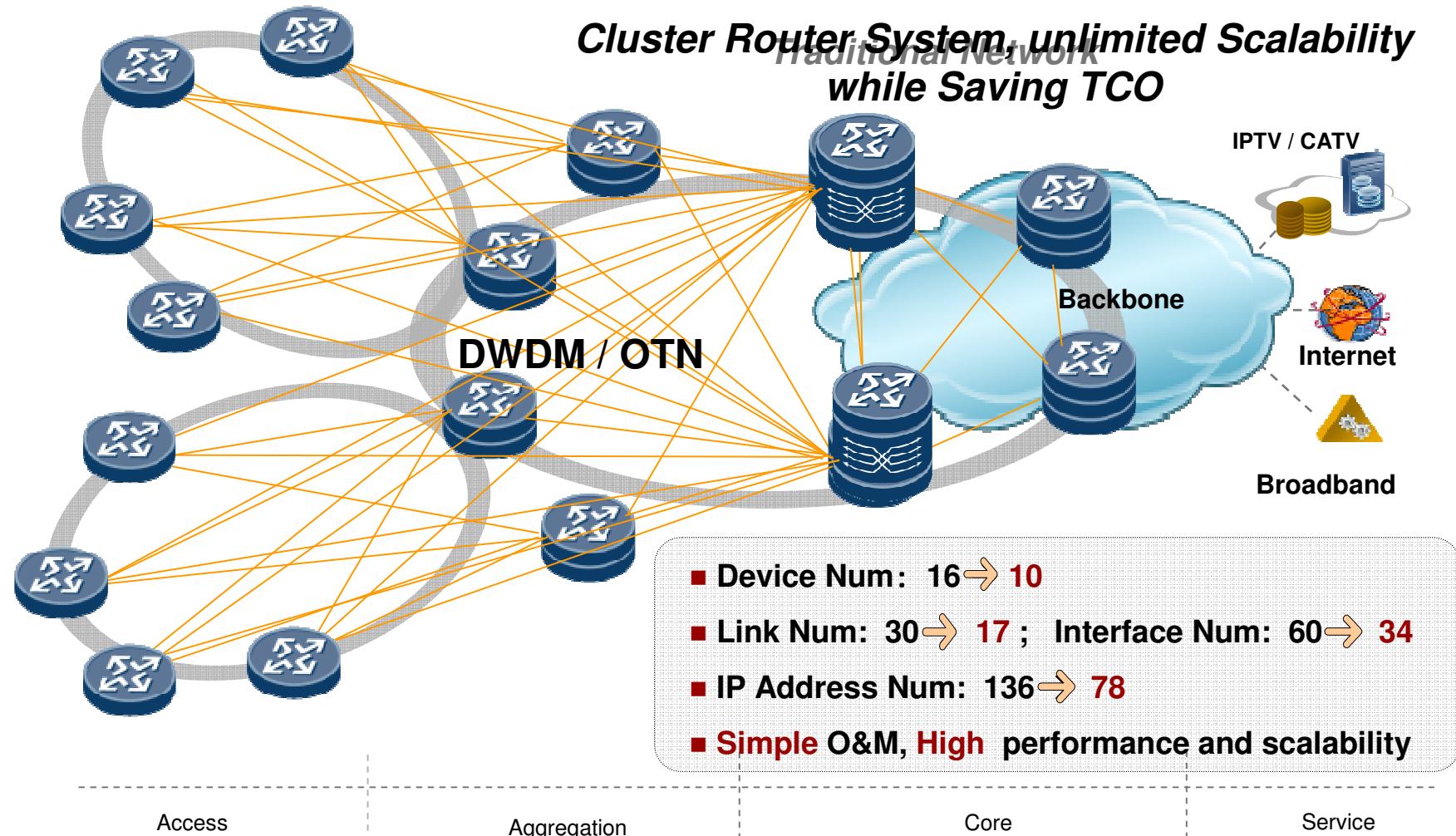


2 Converged IP/MPLS Backbone

- Cluster Router System
- IP & OTN Synergy

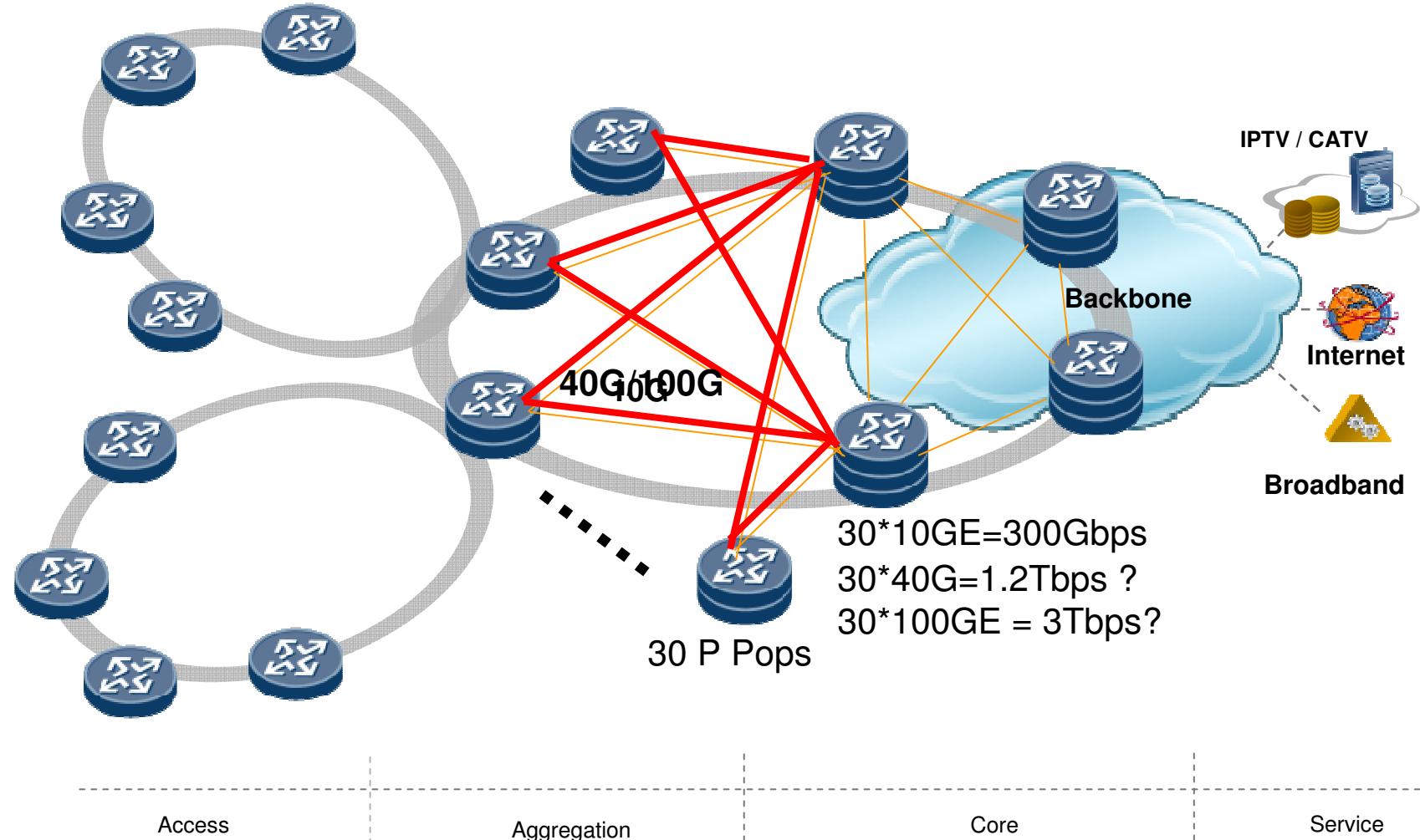
Why Cluster System

Optimized Structure Saving TCO



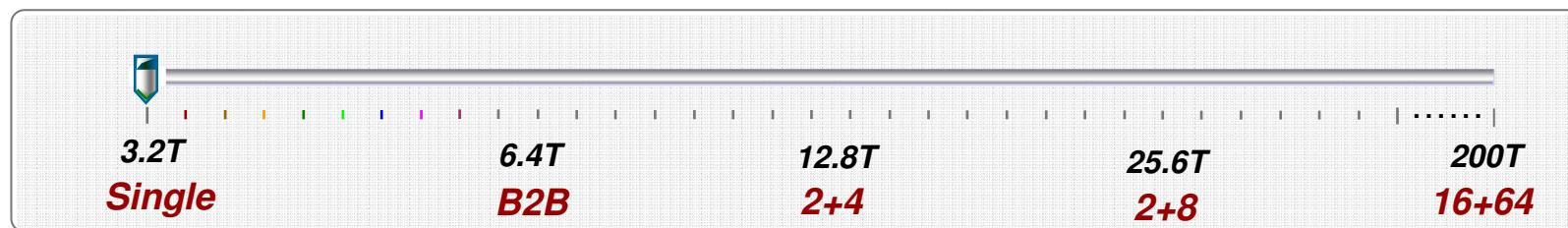
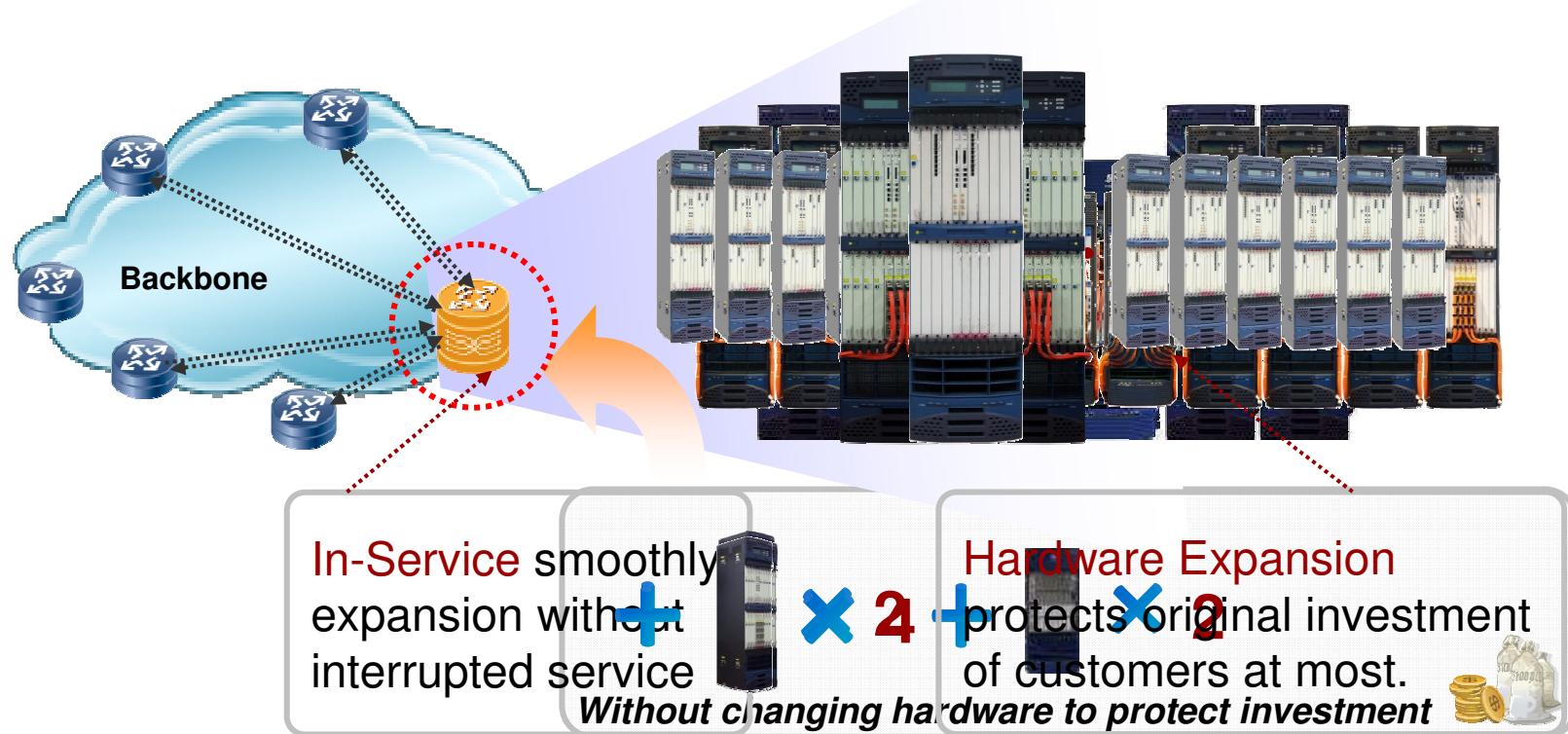
Why Cluster System

Bandwidth Pressure – Can single chassis carry 30*40G or 30*100GE?

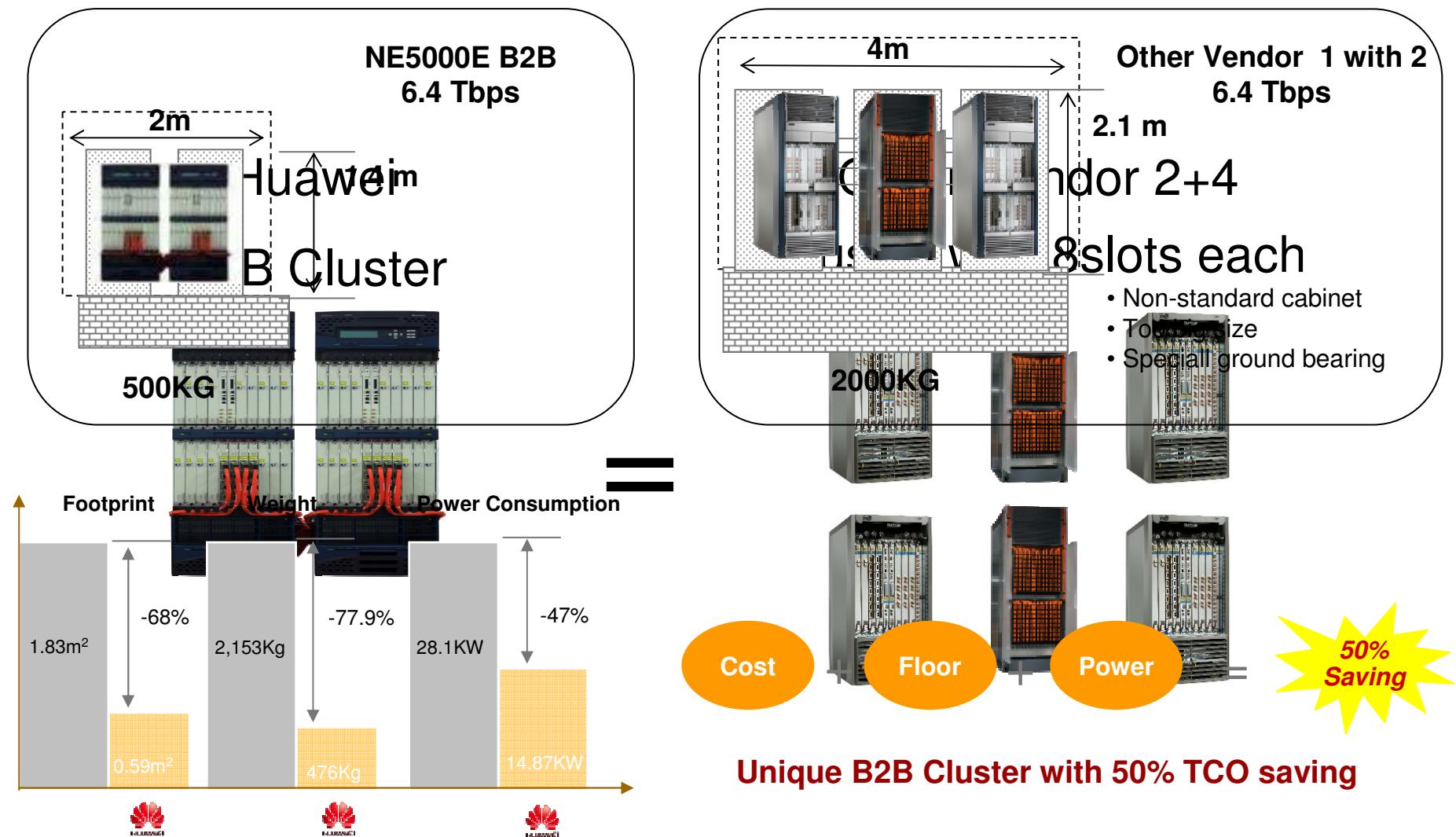


In-Service Hardware Expansion (ISHE)

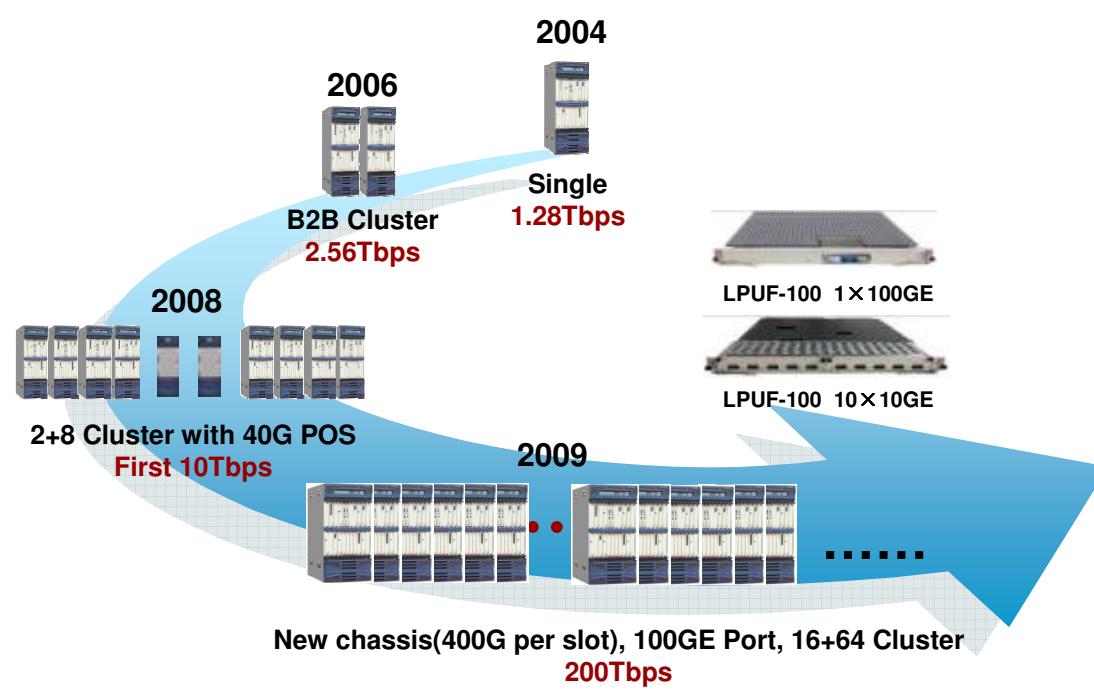
- Smoothest Capacity Upgrade & Best Investment Protection



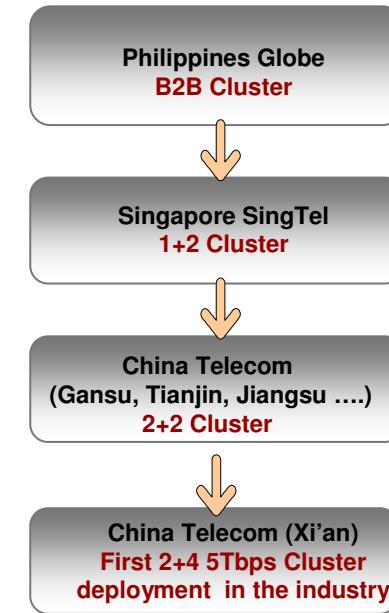
Innovative B2B Cluster



NE5000E: 200T Cluster Suits Massive Traffic Growth



Cluster Commercial Applications

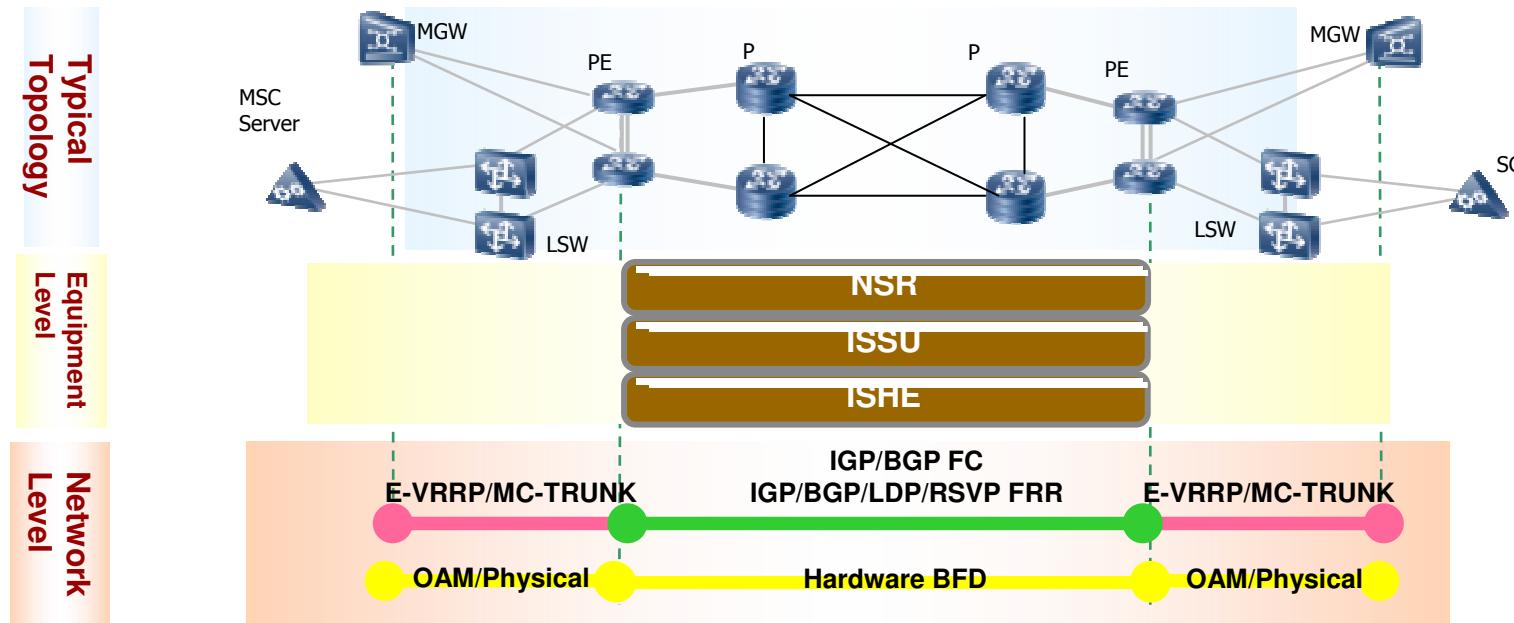


**Design capacity
No.1**

**Application capacity
No.1**

- The total shipments of NE5000E core routers and cluster systems have now exceeded **2,000 sets**, of which over **100 sets** of NE5000E cluster systems were deployed commercially
- The industry-first 5Tbps 2+4 cluster** system deployed in China Telecom Shaanxi province in 2009

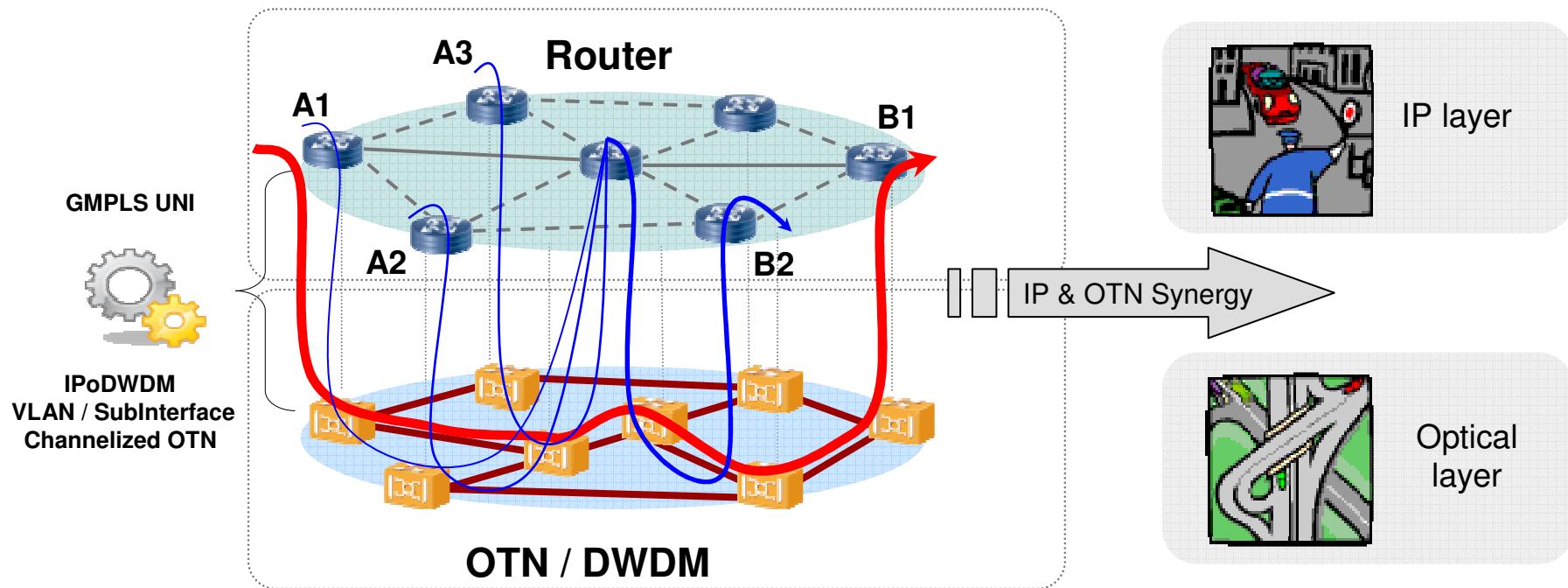
Comprehensive Carrier-Grade Reliability



- **Hierarchical protection** in equipment level and network level
- **Continuous innovation** in reliability technologies, such as VPN FRR, E-VRRP and MC-TRUNK etc
- **50ms** switch-over for link/ P node failure and **200ms** switch-over for any failure

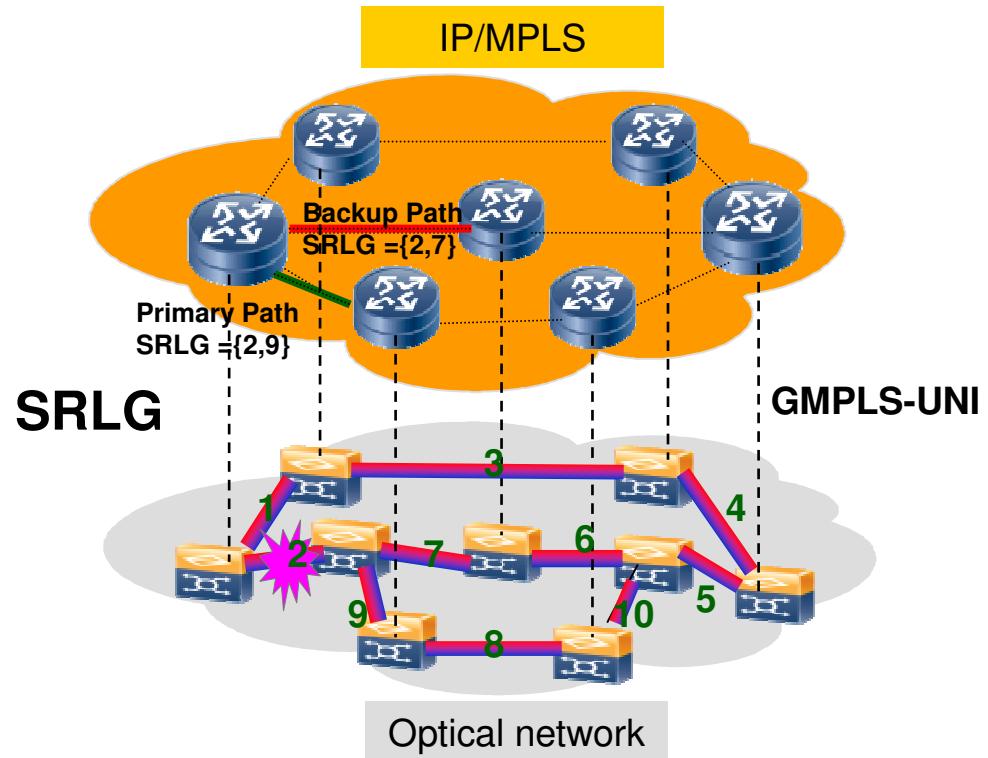
IP & OTN Synergy

- An efficient way to save cost on backbone expansion



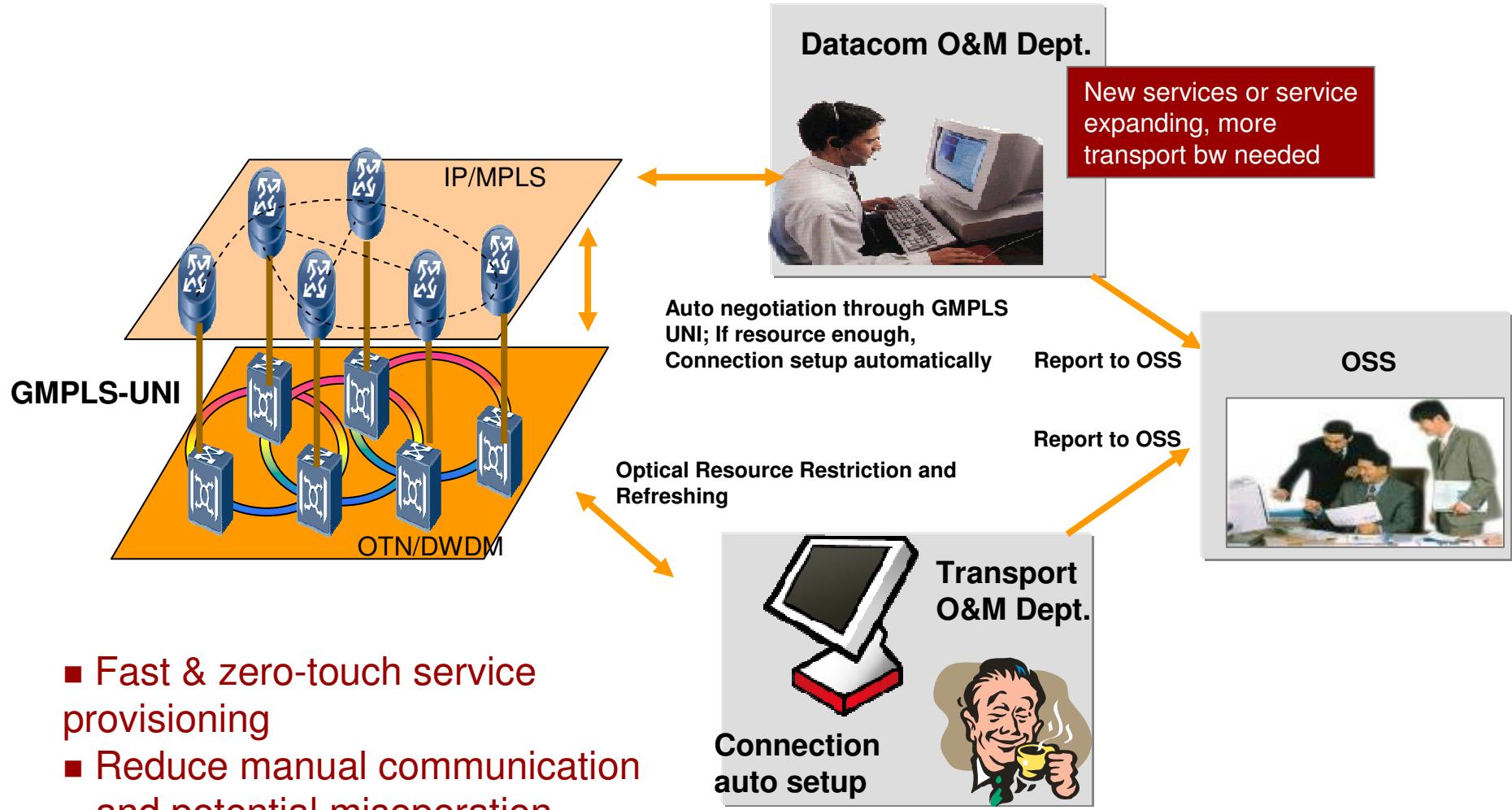
- **Synergized traffic distribution reduces expansion pressure**
 - Multi-layer optimization, save cost on backbone expansion and improve efficiency
 - MDS6600 multi-layer network planning tool, offering highly efficient network resource utilization
- **Synergized protection enhances reliability**
 - Multi-layer protection, SRLG and Dynamic SRLG
- **Synergized provisioning & troubleshooting improves OAM efficiency**
 - GMPLS UNI, Unified Management by U2000 NMS

Synergized Protection Enhances Reliability



- **Shared Risk Link Group (SRLG)** is a mechanism that can prevent all the routes' invalidation at the same time and avoid to configure different routes on the same optical path or node
- **Dynamic SRLG with GMPLS-UNI** can reduce manual negotiation and misoperation, increase efficiency

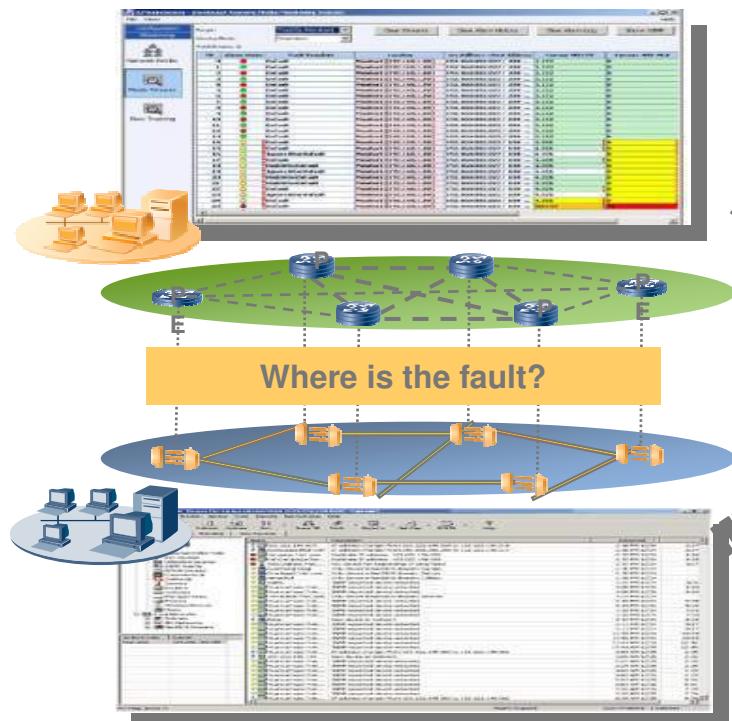
Multi-Layer Service Provisioning



- Fast & zero-touch service provisioning
- Reduce manual communication and potential misoperation

Unified Management & Troubleshooting

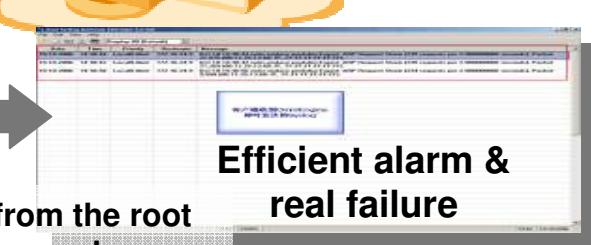
23,000 Alarms/Day, IP Backbone



6,000 alarms per day on WDM Backbone

- Abundant alarms database in both layers
- Customized alarm correlation analysis rules

U2000 NMS & Alarm Center



Alarms derived from the root alarms are suppressed

Efficient alarm & real failure

- Only need to maintain a unified alarm report after Correlation Analysis and Suppression
- Help to fast troubleshooting

One failure in the optical layer will cause almost 10 times failures in the IP layer, so it makes management very difficult to locate the real failure, especially for the operators who has different NMS for different layer networks



3 Success Stories

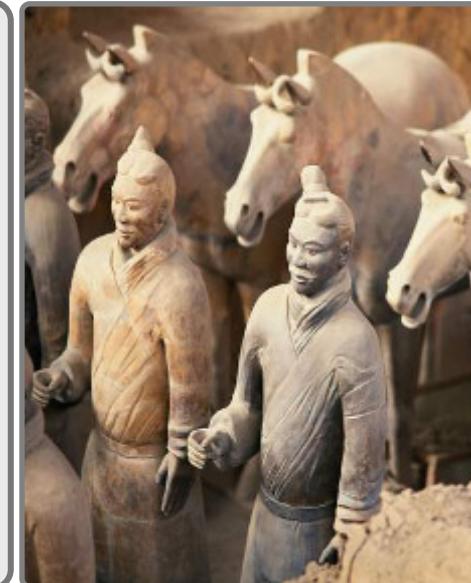
China Telecom - The first 2+4 cluster commercial Application

Background

- China Telecom, the biggest integrated service provider in China
- Providing telephone service for 238 million subscribers and broadband service to 49 million subscribers
- Providing approximately 62% of China's internet bandwidth with "163" network

Challenges

- The needs of broadband service keep strongly growing up
- Facing the direct and indirect competition from other broadband service and wireless service providers
- Improving the operation efficiency further



Huawei 's Solution

- **2 sets of 2 + 4 NE5000E cluster** solution were used in Xi'an MAN Egress to provide sufficient bandwidth
- Supporting smoothly system expansion which significantly saved the investment on network
- Two CRS-1s as the core routers originally were replaced by NE5000E in this project

Benefits to China Telecom

- Step-by-step scalability of Metro Network, which maximizes investment protection for "0" waste
- Upgrade without hardware substitution, and on-demand configuration to ensure network availability
- 163 long-term stable run record since 2004





“Hello. Can you hear me”

**“Yes, we can hear you - and you can count on us
for help.”**