



CASE STUDY

MARKET: TELECOM OPERATOR

REGION: CHINA

COMPANY: CHINA UNICOM

CHINA UNICOM DEPLOYS HIGH-SPEED AGILE OPTICAL NETWORK

40G TODAY - 100G READY!



China United Network Communications Group Co., Ltd ("China Unicom") was established in 2009 as a result of the merger of former China Netcom and former China Unicom. At present, the Company is engaged in GSM and WCDMA cellular business in thirty-one provinces, municipalities and autonomous regions in China, the provision of fixed-line voice, broadband and other Internet-related services, information and communications technology services, business and data communications services, and other related telecommunication value-added businesses.

As of the end of December 2012, the total subscribers of the Company's mobile, local telephone and broadband businesses reached 395 million. China Unicom is among the world's Top 500 companies in terms of revenue, and ranked in the top of the world's leading telecom operators in terms of its customer base and market capitalization of its listed company. It is the only Chinese Telecom operator listed on the stock exchanges in New York, Hong Kong, and Shanghai.

CHALLENGES

- Increase the number of homes with access to broadband services
- Increase fiber-to-the-home network coverage
- Propel China's average broadband bandwidth capacity in urban regions to 20 Mbps by 2015
- Increase China Unicom's mobile subscriber base, from 40 Million in 2011 to 76 Million in 2012
- Provide a backbone network infrastructure having the capacity and efficiencies in both fixed and mobile broadband services
- Enable future scaling to meet growth in subscriber bandwidth consumption

SOLUTIONS

- Alcatel-Lucent's 1830 Photonic Service Switch (PSS) for five new national backbone networks
- Alcatel-Lucent's 40G coherent technology with graceful evolution to 100G wavelength capacity
- Alcatel-Lucent's 1830 PSS converged WDM/OTN platform for cost-effective and efficient grooming of lower bit rate into high capacity 40G coherent wavelengths

BENEFITS

- Optimized transport of various services over a common OTN and ROADM network through use of the Multi-Layer Planning tool
- High performance, high bandwidth transmission with coherent wavelengths
- Real time wavelength service monitoring through Wavelength Tracker
- Maximum wavelength utilization and greater flexibility with OTN sub-lambda grooming and switching
- Reliable end-to-end solution with combined WDM and OTN GMPLS-based protection schemes
- Agile Multi-Degree ROADM architecture controlled via management system



THE CHALLENGES

Bandwidth demand is driven by data and video traffic. After continuous investment and growth of its mobile and fixed-line broadband subscriber base, China Unicom has become the major IP service provider in China. Traffic granularity in China Unicom's transport network must increase due to high speed IP router interconnection, and the unrelenting demand of 40 Gb/s trunks. In 2012, the granularity of IP router interconnection had been mainly 10 Gb/s and 40 Gb/s, but this is shifting to be predominately 40 Gb/s with an evolution to 100 Gb/s soon anticipated.

The "Broadband China" project recently announced by the Chinese Ministry of Industry and Information Technology is intended to drive a significant increase in the number of homes with broadband access – to more than 70% of the country's Internet users by the end of 2013. This includes increases to fiber-to-the-home coverage by more than 35 million households. Broadband China also seeks to propel China's average broadband bandwidth capacity in urban regions to 20 Mbps by 2015, with 250 million users.

In addition to supporting this fixed broadband service expansion, China Unicom is also significantly increasing its mobile subscriber base, from 40M in 2011 to 76M in 2012.

Support for this growth – in both fixed and mobile broadband subscribers, as well as with enterprise services – requires a backbone network infrastructure having the capacity and efficiencies enabled by Alcatel-Lucent's Agile Optical Networking solutions.

THE SOLUTION

40 Gbps now; 100 Gbps-ready strategy. To support unrelenting traffic growth with their subscriber base, China Unicom has selected Alcatel-Lucent's 1830 Photonic Service Switch (PSS) for five new national backbone networks with a total transmission distance of 5,000 km covering all the eastern area of China including Beijing, Shanghai, Guangdong, Zhejiang, Fujian, Jiangsu etc..

The 1830 PSS nodes will initially be equipped with Alcatel-Lucent's 40G coherent technology that will ensure graceful upgrade to 100G in order to enable future scaling to meet subscriber bandwidth growth. Use of Alcatel-Lucent's BPSK-based 40 Gbps coherent technology provides the advantage of unimpeded mixing of 40G and 100G WDM channels as needed.

The project includes Alcatel-Lucent 1830 PSS converged WDM/OTN platform for supporting seamless combination of WDM and OTN capabilities. The five

national backbone networks based on Alcatel-Lucent's WDM and OTN technology will include no less than five hundred 40 Gbps coherent transponders.

Use of coherent technology for 40 Gbps as well as for 100 Gbps enables much greater reach while dramatically reducing the need for regeneration and at the same time eliminates the need for Dispersion-Compensation Modules (DCMs).

WHY ALCATEL-LUCENT?

Alcatel-Lucent's Agile Optical Networking provided by the 1830 Photonic Service Switch (PSS) enables a scalable, versatile, and dynamic solution. Real-time re-configurability reduces capital and operating expenses through improved efficiency while accelerating time-to-revenue through faster provisioning of the turn-up and tear-down of wavelength and sub-wavelength services. Agile Optical Networking is achieved through

support of multiple network layers, services, and protocols. Best-in-class managed photonics, multilayer switching and intelligence in a proven purpose-built platform enables China Unicom to realize the full potential of their optical network in the cloud services era.

The 1830 PSS platform's integrated Wavelength Tracker provides photonic layer OAM and service assurance which proved to be a critical solution differentiator for China Unicom. Wavelength Tracker automatically monitors and adjusts wavelengths and power levels at any point in the network, without requiring manual measurement using Optical Spectrum Analyzers (OSA).

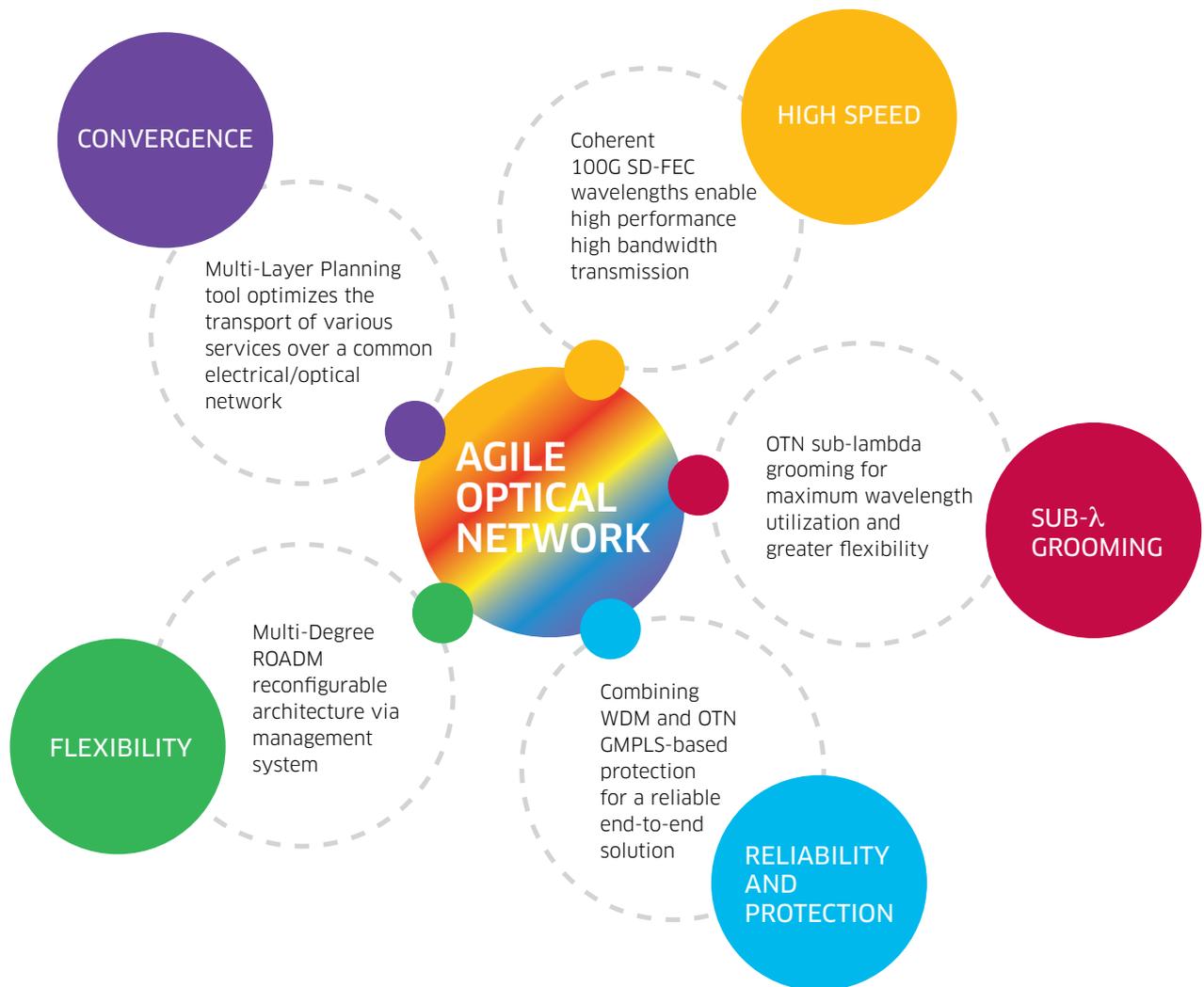
Wavelength Tracker's optical layer management delivers wavelength path tracing and monitoring capabilities and provides proactive service assurance at low operational costs. Optical performance monitoring through Wavelength Tracker

enables service-aware wavelength management with easy-to-use graphical displays for quick troubleshooting and fault isolation, and saves on specialized training and costly optical test equipment.

This innovation employs a unique management signal on each wavelength allowing it to be identified and monitored at any point throughout the network, without termination or regeneration. This action provides operators an integrated view of all wavelengths at different points across the network, allowing these wavelengths to traverse the network while being traced, to track the behavior of each wavelength, isolate faults, monitor performance and correlate alarms.

Wavelength Tracker optical layer management enables the delivery of true optical SLAs, reduces network operational costs and makes optical networks simpler to manage.

Figure 1. Alcatel-Lucent Optical Networks benefits



BENEFITS AND FEATURES

The Alcatel-Lucent 1830 Photonic Service Switch (PSS) supports next-generation WDM multiservice transport from access to core. The scalable switch drives lower TCO and extends network life cycles. The 1830 PSS transforms traditional WDM into a flexible transport layer with managed agile photonics, multilayer switching and services, in addition to

increased network intelligence. The T/ROADM platform supports a wide range of applications and services such as Carrier Ethernet, mobile backhaul and multicast video. With 1830 PSS platforms ranging in size from compact access to converged Optical Transport Network (OTN)/WDM core, operators can optimize multiservice networks to meet unpredictable traffic demands.

The 1830 PSS portfolio provides terabit OTN switching and photonics capacities. The 400G Photonic Service Engine enables high-performance 100G and an evolutionary path to 400G transport. Leveraging an intelligent control plane and integrated data, management and control planes, the 1830 PSS simplifies network management for maximum multilayer performance and efficiency.

Minimizes TCO by leveraging a versatile platform suited for a wide range of transport applications

- Unconstrained service grooming at wavelength, port and sub-port levels
- Optical transport for any application, fiber type and reach
- Enhanced packet optical features: ODUflex, ODU4, Carrier Ethernet, in-flight encrypted wavelengths

Maximizes ROI with integrated photonic, OTN and packet networking technologies

- 8.8 Tb/s at 100G with a non-disruptive path to 400G
- Service-agnostic matrix powered by a 1 Tbps OTN chip
- Traffic-specific service grooming at the most economical layer
- Integrated Packet Transport for efficient, versatile and reliable Layer 2 transport

Maximizes revenue opportunities by meeting unpredictable traffic dynamics with agility

- Multilayer network planning, control and photonic service management using Wavelength Tracker
- Tiered resiliency levels for value-based SLAs
- CDC-F ROADM with OTN switching in a single integrated platform
- GMPLS-based control plane for automated multilayer restoration and protection schemes



**Alcatel-Lucent 1830 PSS
converged WDM/OTN platform**