China Mobile Zhejiang

Commercial iMaster NCE Deployment for 4G/5G Converged Transport

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Background

In 2019, the Zhejiang Provincial Government decided to "take the lead in 5G commercialization". On April 28, the Zhejiang Provincial Government and three major carriers (China Mobile, China Telecom, and China Unicom) held a joint press conference on 5G+ and released the white paper *Executive Opinions on Accelerating the Development of the 5G Industry*. The paper states that by the end of 2022, Zhejiang will become a pioneer in 5G network construction, a demonstration area for innovative applications, and an area for industrial agglomeration. The revenue from 5G-related industries and from core industries of the digital economy will attain 400 billion RMB and 25 trillion RMB, respectively.

Compared with 4G, 5G provides 10 times more bandwidth and stricter SLA compliance, meeting the diversified requirements of emerging services from vertical industries. These services include 4K/8K video, VR live stream, and 5G telemedicine.

In terms of network deployment and O&M, traditional device-centric network architecture and manual O&M are both unsustainable in the 5G era. It is imperative to improve network deployment and O&M efficiency through automated and intelligent methods.

The transport network must be fully established before 5G can be commercially deployed. China Mobile Zhejiang and Huawei jointly built an intelligent, simplified 5G transport network that features high-quality transport, cost-effective construction, and efficient O&M.

Challenges

Hangzhou is the first city in China to deploy 5G. As early as 2016, China Mobile Zhejiang and Huawei started joint innovation within Hangzhou. After two years of technical verification and live network research, this project now ranks first across China Mobile Group in terms of test indicators. In addition, the project meets preliminary commercialization requirements. The packet transport network (PTN) currently faces the following challenges:

- **Stovepipe OSS management**: It is desirable to have one set of NMS for devices from the same vendor within one province. However, multiple NMSs (such as U2000 and uTraffic) are currently deployed in each city, making centralized O&M impossible.


- **Coexistence of 4G and 5G services**: 5G evolves from 4G, and unified O&M is required for old and new technologies to coexist. Live network data needs to be smoothly upgraded to prevent 4G and 5G services from interfering with each other.

4G base stations

5G base station

EPC
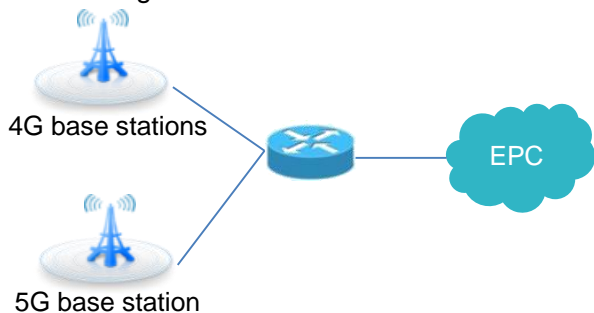
- **Difficult O&M**: 5G services pose higher bandwidth, delay, and reliability requirements. The number of 5G base stations required is 1.5 times that of 4G base stations for the same network coverage. The introduction of new technologies, such as SRTP and SDN, makes O&M more difficult.

Solution

iMaster NCE is the industry's first network automation and intelligence platform that integrates management, control, analysis, and AI functions. It effectively connects physical networks with business intents and implements centralized management, control, and analysis of global networks. In addition, it enables resource cloudification, full lifecycle automation, and data analytics-driven intelligent closed-loop management according to business and service intents, and it provides open network APIs for rapid integration with IT systems.
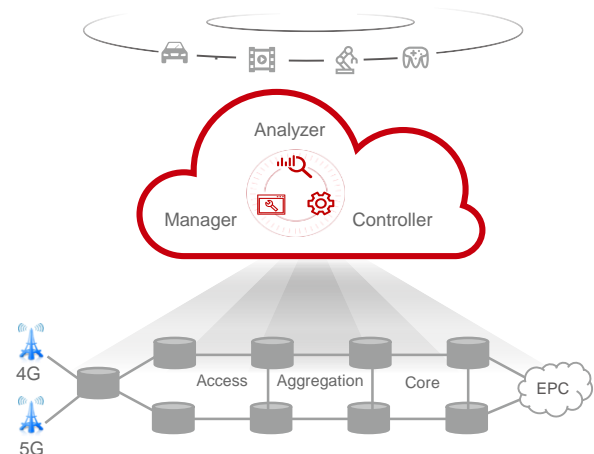
China Mobile Zhejiang uses iMaster NCE to manage and analyze the 4G/5G hybrid transport network. iMaster NCE provides the management, control, and analysis functions that used to be provided by different OSSs, manages 4G and 5G services separately, and implements intelligent O&M that covers planning, construction, maintenance, and optimization.

Convergence and migration of live network OSSs for centralized management, control, and analysis

The data of multiple sets of U2000 and uTraffic was migrated to iMaster NCE by three engineers within two days through a professional migration tool. Compared with the replacement of centralized U2000 with distributed U2000, efficiency improved by over 80%. After the migration, over 60 O&M personnel are concurrently online every day, and more than 240,000 tunnels and PWE3 services are delivered within one week, fully displaying the advantages of iMaster NCE.

Permission- and domain-based management of 4G and 5G services

iMaster NCE provides permission- and domain-based policies and supports static configuration of MPLS-TP tunnels, centralized path computation of SR-TP tunnels, as well as centralized service configuration and management on 4G and 5G base stations.
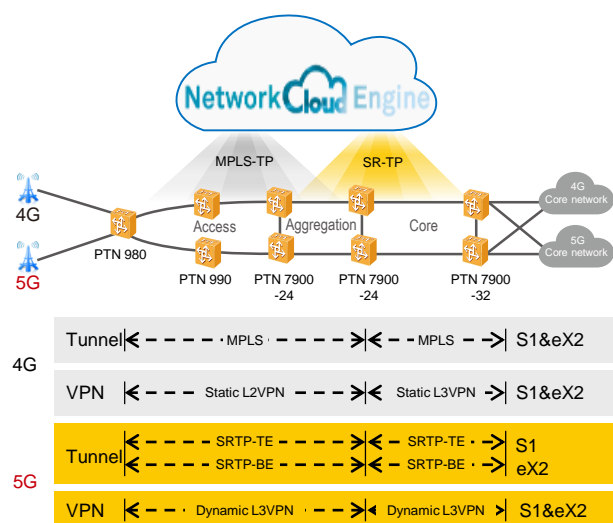
Application of innovative technologies for intelligent O&M

- **Fast site addition**: CSG plug-and-play and fast service deployment within 5 minutes
- **Intelligent clock deployment**: network-wide clock support evaluation, automatic fiber delay measurement, and asymmetric clock compensation, shortening clock deployment from two months to less than five days
- **1:1 permanent service protection**: protection against multiple points of failure on primary and backup tunnels. An automatic switchover can be completed within 50 ms, eliminating the need for emergency repair.
- **Inband flow information measurement (iFIT)**: replacement of minute-level measurement by traditional NMSs through second-level measurement, improving measurement accuracy.
- One-click path restoration, performance replay, and hop-by-hop diagnosis enable fast fault demarcation and locating.

Full-stack Huawei systems for service continuity
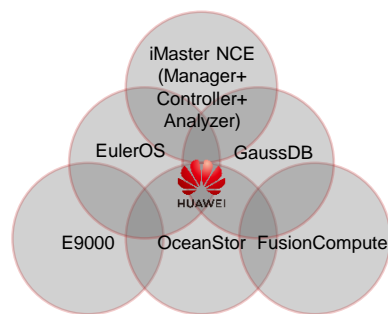
Commercial deployment environment at China Mobile Hangzhou

Effectiveness

iMaster NCE utilizes big data analytics to implement automated, intelligent O&M of the 5G transport network throughout its lifecycle.

"China Mobile Zhejiang worked with Huawei on the NetCity project. This project applies leading technologies such as AI and big data to the 5G transport network to improve network deployment and O&M efficiency, and build an automated, intelligent, non-blocking 5G transport network."

— Shen Gangwei, Deputy General Manager, Department of Planning and Technology, China Mobile Zhejiang

Follow-up Plans

China Mobile Zhejiang has smoothly migrated existing NMSs on their 4G/5G hybrid transport network to iMaster NCE for intelligent O&M. iMaster NCE will continue to enhance AI and big data applications. China Mobile and Huawei will continue to work together to lead the industry and promote 5G success.

Services Provided by Huawei

iMaster NCE is based on the unified cloud platform. It flexibly packs feature modules based on application scenarios and provides multiple offerings, such as NCE (Super), NCE (IP Domain), NCE (Transport Domain), and NCE (Access Domain). A single-domain iMaster NCE product can evolve towards the multi-domain iMaster NCE architecture. In addition, the Manager, Controller, and Analyzer modules of iMaster NCE can be purchased and deployed on demand.