Huawei e-Hospital Solution

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Background

Information and communications technology (ICT) plays an increasingly important role in the daily operation of hospitals. Advanced ICT systems serve as a hospital's central nervous system and significantly improve medical service efficiency and quality.

Huawei, as a leading global ICT solutions provider, has extensive experience in the medical industry and ICT solution development. To help hospitals improve service quality, Huawei and its partners developed the e-Hospital solution that covers hospital management, ICT-based clinical services, and ICT infrastructure. The following sub-solutions are also included:

- Convergent network
- Cloud-based hospital data center
- Telemedicine
- Wireless hospital

These sub-solutions provide services for patients, medical care personnel, and hospital administration.

Requirements & Challenges

Medical information systems have evolved in recent decades from administration- and doctor-centric to patient-centric. Patient centered medical information systems offer network infrastructure, e-administration, telemedicine, mobile medicine, and a hospital data center. However, these systems face the following challenges:

- Traditional telemedicine systems provide only standard-definition (SD) video services that prove ineffective in medical treatment. These independently developed systems cannot integrate with hospital ICT systems.
- Mobile medicine brings higher demands on wireless network stability, performance, anti-jamming capability, and roaming service support.
- ICT infrastructure construction periods can be lengthy, involve difficult operation and maintenance (O&M) management, and energy-consuming data centers, and have low system scalabilities.
  Hospitals need highly reliable, secure, and convergent networks to meet future service requirements.

Solution Overview

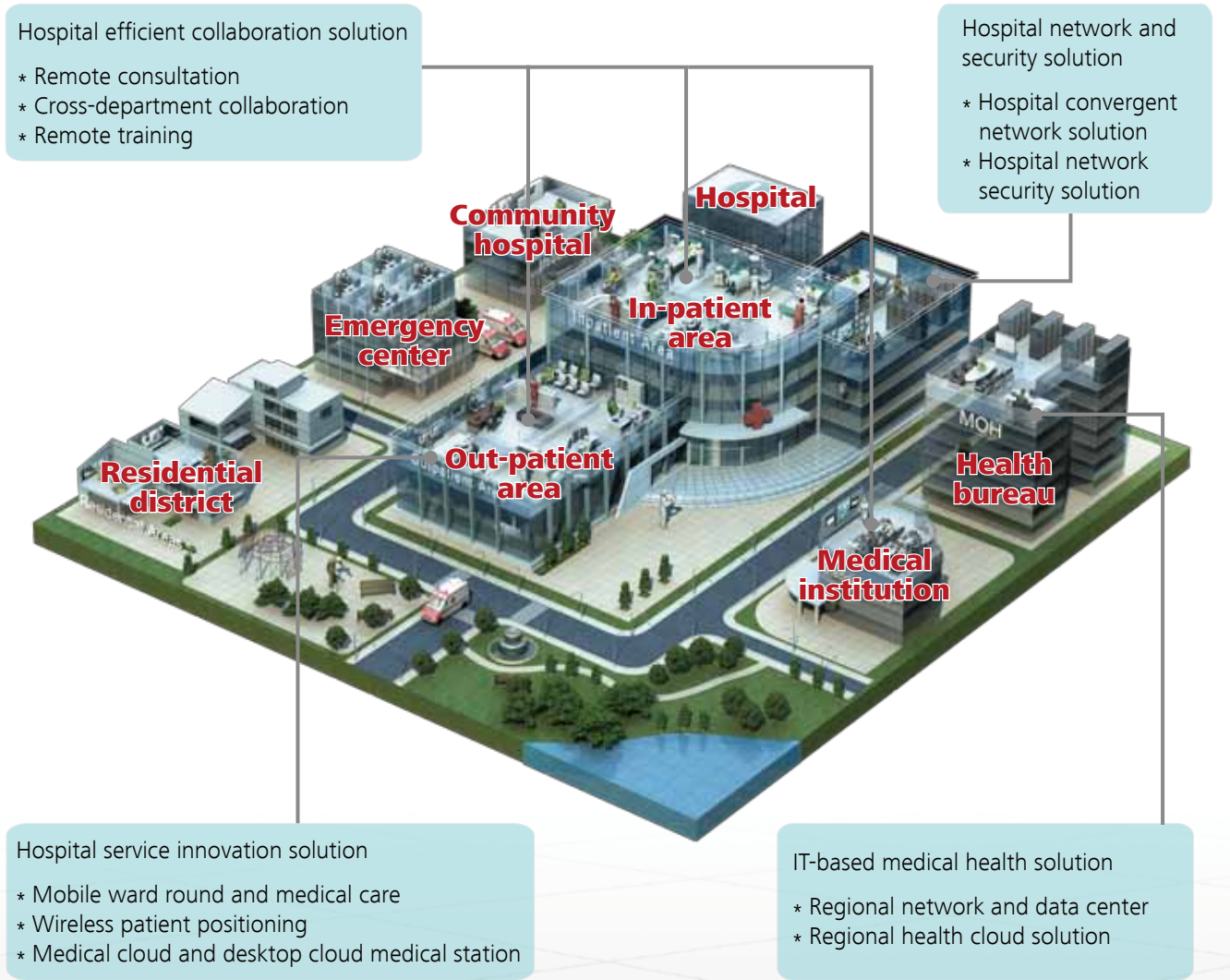Huawei's e-Hospital solution has the following features:

- ICT-based hospital services that feature comprehensive network applications and paper- and film-free operation
- Efficient ICT resource management and application integration, making full use of ICT system advantages
- Service-oriented medical ICT systems that allow cross-region information sharing and continuous innovation, facilitating hospital growth

Huawei e-Hospital Solution

Huawei's e-Hospital solution involves an impressive array of hospital ICT systems, such as wired and wireless networks, data centers, medical treatment systems, and hospital administration systems. Based on service requirements, Huawei tailored the cloud-based ICT platform to provide telemedicine, mobile medicine, cloud desktop, unified communications (UC), office collaboration, video surveillance, and linked medical information. These sub-solutions allow hospitals to improve user experience, service quality, and work efficiency, while lowering the total cost of ownership (TCO).

Developing medical ICT systems requires the participation of all parties in the industry chain. Huawei leveraged its ICT experience to thoroughly cooperate with industry independent software vendors (ISVs) and system integrators (SIs) to fully meet hospital service requirements and promote ICT-based medical industry development.

Hospital efficient collaboration solution

* Remote consultation
* Cross-department collaboration
* Remote training

Hospital network and security solution

* Hospital convergent network solution
* Hospital network security solution

Hospital service innovation solution

* Mobile ward round and medical care
* Wireless patient positioning
* Medical cloud and desktop cloud medical station

IT-based medical health solution

* Regional network and data center
* Regional health cloud solution

Convergent Network Solution

In the last few years, the medical industry has witnessed the rapid development of medical ICT systems, such as telemedicine, PACS, and mobile medicine systems. Traditional medical systems can no longer meet hospital service requirements. Hospitals need new network solutions to provide enhanced security protection, highly reliable data bearing, and high-bandwidth data transmission services.

Based on an in-depth understanding on the medical industry's service requirements, Huawei provides end-to-end ICT services that covered solution design, project delivery, system operation and maintenance, and complete professional services. Huawei's convergent network solution integrates wired and wireless networks, manages network devices in a unified manner, interconnects networks, and physically isolates network devices to enhance security protection and ensure stable and efficient operation.
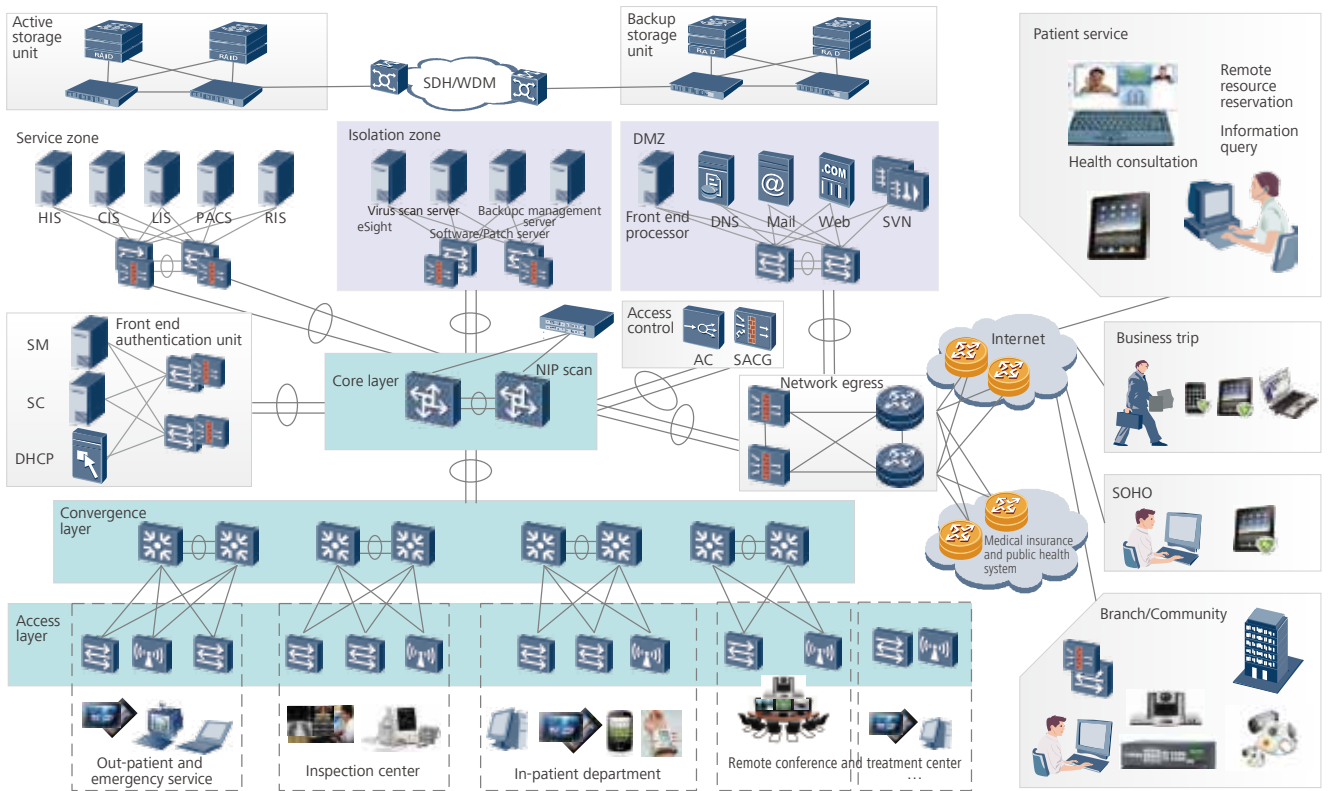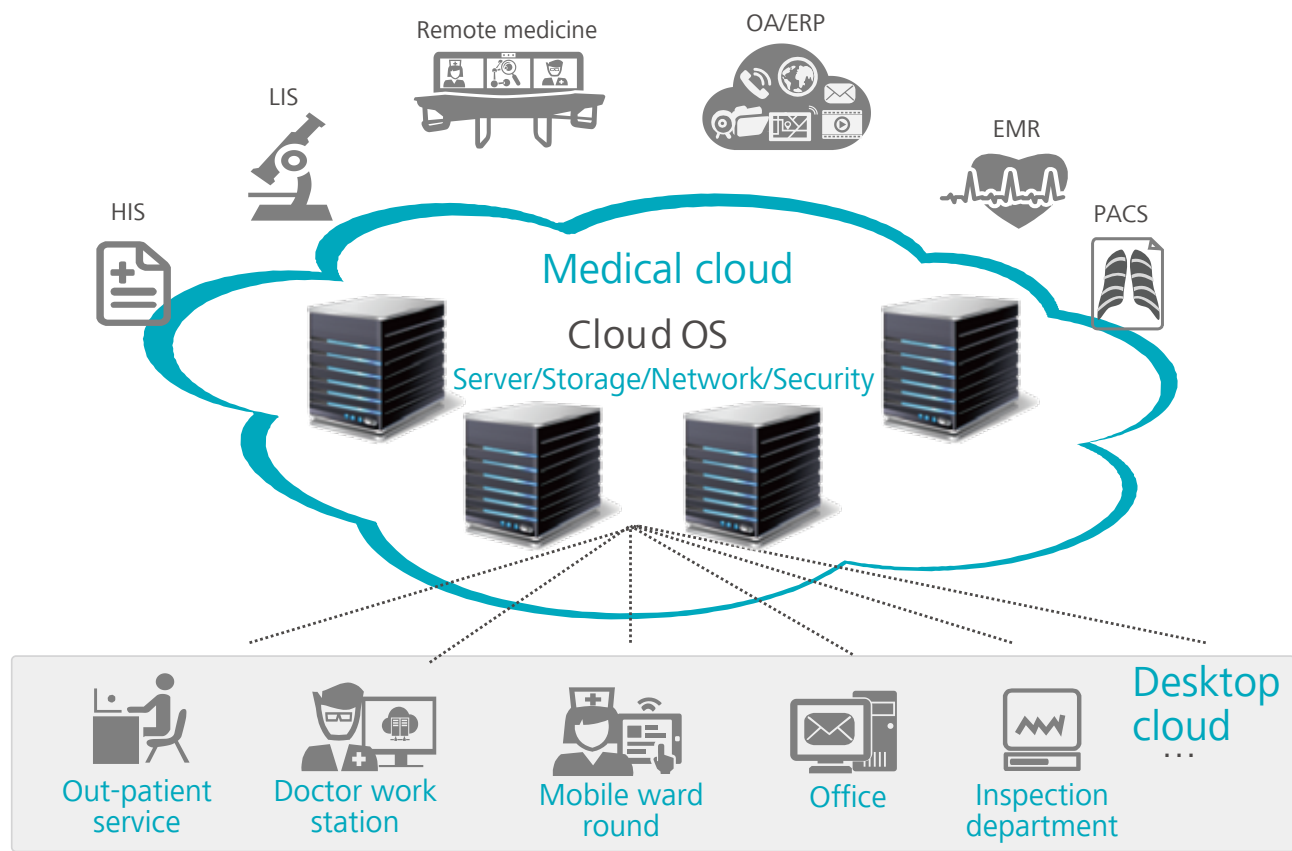

Highlights

- High performance: GE/10GE network transmission capacity, high-capacity switching-network cluster (4 times as much as the industry mainstream service cluster bandwidth), and 100% link usage
- High reliability: CSS + LAG + iStack quick loop-free Ethernet that uses multiple cutting-edge technologies, such as Virtual Router Redundancy Protocol (VRRP), Rapid Spanning Tree Protocol (RSTP), NVIDIA Shading Rasterizer (NSR), and non-stop forwarding (NSF) to offer industry-leading system reliability and five-nine single-device reliability
- High security: a variety of security technologies, such as network access control (NAC), IPSec and SSL VPN remote access control, Dynamic Host Configuration Protocol (DHCP), Address Resolution Protocol (ARP), Media Access Control (MAC), protection against IP-based attacks, and service isolation, ensuring network security
- High convergence: visual intelligent network management, allowing unified network device management; integration of wired and wireless networks, lowering construction and O&M costs; integration of data center LANs and SANs, enabling unified exchange

Cloud-based Hospital Data Center Solution

The popularity of cloud computing technologies exerted significant influence on the development of medical ICT systems. Traditional medical architectures can no longer meet the medical industry's changing requirements. Therefore, hospitals need an advanced cloud-based solution that features efficient resource sharing and service-based resource distribution to support service development and innovations.

Huawei's cloud-based hospital data center solution centrally manages and shares hospital ICT resources. This flexible cloud-based solution significantly improves service reliability, enhances data security, lowers O&M costs, and ensures the quick deployment of new services.
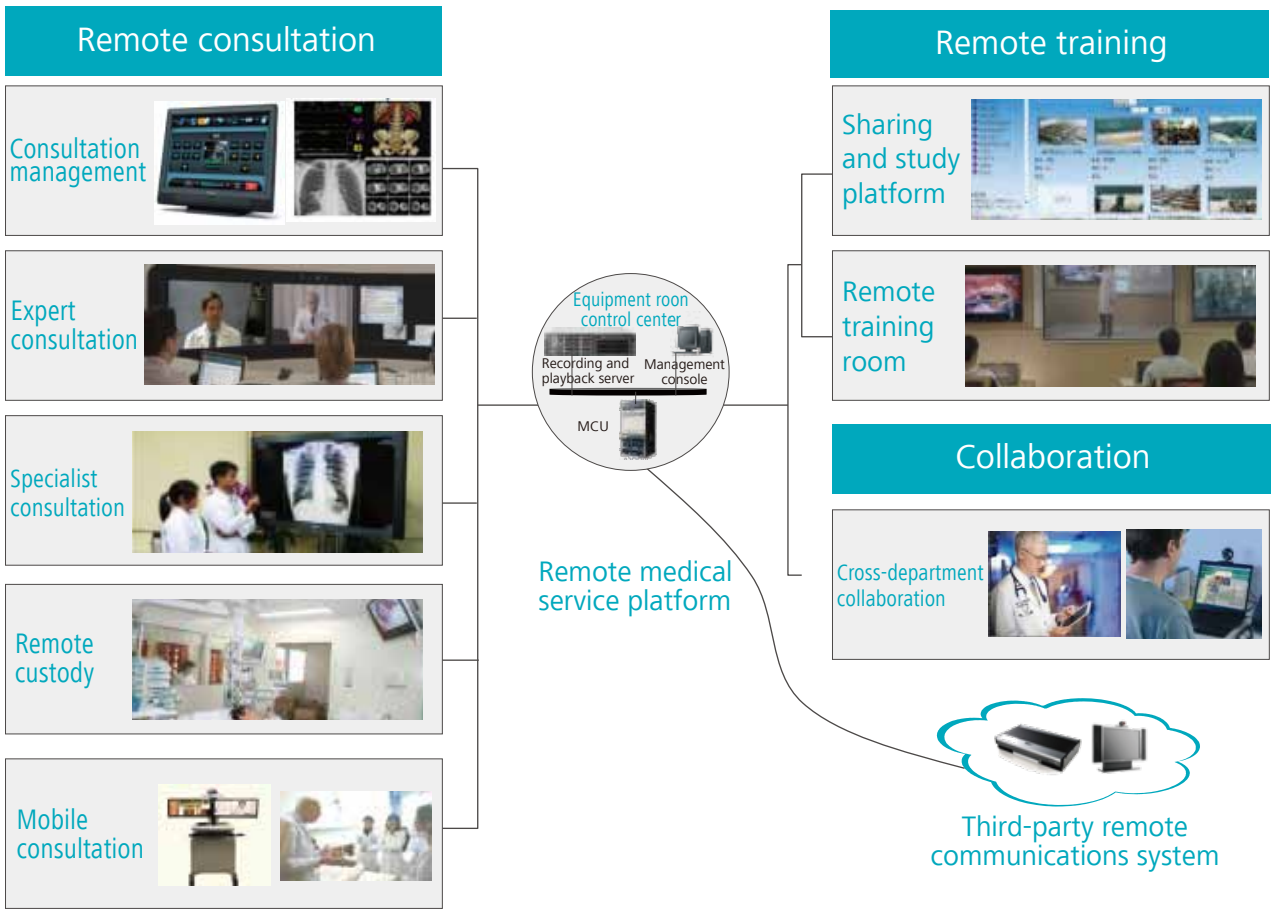

Highlights

- Service system integration, lowering server storage costs by 30% and improving system O&M efficiency by 100%
- Network device backup mechanism, preventing single point failure
- Remote disaster recovery mechanism that allows network service switchover within 15 minutes
- Access control system that allows medical care personnel to use a variety of terminals to access desktop resources without compromising system data security
- Global experience, providing cloud desktop services for over 80,000 users worldwide

Telemedicine Solution

The telemedicine solution allows hospitals to expand service coverage, explore new medical services, and enjoy cross-region resource sharing. The solution also provides remote consultation, training, and collaboration, helping hospitals minimize travel and training costs.

Huawei's telemedicine solution combines state-of-the-art telepresence technologies into one comprehensive remote training system that includes a remote consultation center, telepresence consultation room, remote classroom, and mobile consultation terminals. The solution deploys remote consultation devices in rural medical institutions and ambulances that have satellite communications devices. The panoramic telepresence system allows patients and medical care personnel to enjoy face-to-face communication in remote consultation. When data collection devices are connected to hospital ICT systems, the telemedicine system can collect, transmit, and share data in real time.

Highlights

- World's first panoramic telemedicine system, offering face-to-face communication
- HD video at lower bandwidth, transmitting 1080p video at 1 Mbit/s bandwidth and lowering network operation costs
- Stable network connection between the telepresence system and onsite digital medical devices, allowing live consultation and diagnosis
- Mobile telepresence terminals that allow patients to receive consultation services at home
- Open telepresence platform that seamlessly integrates with telemedicine service systems, simplifying consultation processes
- Access control services that allow users to access hospital ICT systems anytime and anywhere using a variety of terminals, including telepresence endpoints, mobile phones, tablets, and laptops

Wireless Hospital Solution

Innovative technologies are changing the way medical care is delivered. A considerable number of hospitals are now using wireless network technologies to provide mobile medical services, such as conducting mobile ward rounds, infusion, and maternity care. Integration of the Internet of Things (IOT) and wireless networks brings more service innovation possibilities. Therefore, hospitals need an advanced, reliable, and high-performance wireless network platform.

Huawei's wireless hospital solution offers a high-speed, reliable, and secure Wi-Fi network platform for hospitals. The solution has the following features:

- Supports flexible device deployment in indoor and outdoor environments, lowering network deployment costs
- Uses unified security management policies to prevent medical information loss

    Provides open Wi-Fi interfaces to meet telemedicine service requirements and facilitate service innovation

Mobile clinical services   Patient positioning function   Mobile office

AC

Positioning service   TSM security   Mobile applications   HIS   eSight

Indoor installation

AP

Indoort deployment   Wi-Fi

Medical tablet (extension cover)   Medical mobile phone (extension cover)   Wi-Fi label   Mobile inspection terminal

Highlights

Medicine-class Wi-Fi coverage that allows seamless network switchover and ensures service continuity
- Industry-leading wireless positioning technologies (error range < 3 m), improving hospital assets management capabilities
- Customized medical terminals that meet the service requirements of mobile diagnosis and treatment.
- BYOD services that allow hospital employees to provide office and medical care outside hospitals
- Comprehensive security protection for wireless terminals, preventing medical information loss
- Certified in Hospital Wireless LAN Development Regulations, meeting service requirements in hospital environments

FAHZU Telemedicine Project

Background

In 2011, the Ministry of Health required 22 provinces in the central and west regions of China to develop remote consultation systems. As one of the pilot hospitals, First Affiliated Hospital of Zhengzhou University (FAHZU) utilized the cutting-edge ICT technologies to share medical resources with all county hospitals within Henan province. These systems helped local hospitals to improve medical service quality, balanced medical resource distribution across the province, and accumulated valuable experience for medical industry reform.

Solution

Based on an extensive analysis of customer requirements, Huawei provided the telemedicine solution for FAHZU.
- Developed the remote consultation center, telepresence consultation room, remote training classroom, video-based surgery recording system, consultation room in county hospitals, and ambulances equipped with satellite communication devices
- Used the existing IP network to connect a total of 120 sets of telepresence devices deployed in 118 county-level medical institutions
- Integrated the medical-data collection system with medical devices and ICT systems of mainstream vendors, such as the hospital information system (HIS), PACS, and customer information system (CIS), enabling real-time data collection, transmission, and sharing

Benefits

FAHZU's telemedicine platform is Henan's biggest telemedicine center. The platform successfully promoted expert resource sharing across the province, balanced Henan's medical resource distribution, and improved FAHZU's position and influence in the medical industry.

Chen Zhu, former minister of the Ministry of Health, commented, "First Affiliated Hospital of Zhengzhou University shared medical resources with county hospitals, and helped these hospitals deliver high-quality services to county residents."

Peking University First Hospital Mobile Medicine Project

Background

In the last few years, Peking University First Hospital spent much energy on utilizing innovative technologies and developing hospital ICT systems. The hospital cooperated with world renowned ICT solution vendors to reform its HIS, laboratory information system (LIS), and PACS system. In 2012, Peking University First Hospital initiated design of a wireless ward round system, in an effort to improve its inpatient service experience. However, the hospital faced diverse challenges in system development, such as complicated network environments, security isolation between the wired and wireless networks, seamless roaming of layer-3 services, and reliable access control mechanisms.

Solution

To help Peking University First Hospital address these challenges, Huawei took the following action:
- Deployed indoor access points (APs), indoor distributed APs, and outdoor APs to develop the wireless network carrying medical data
- Used network design and optimization tools to provide wireless network coverage for a second inpatient area and other hospital areas, meeting seamless service roaming and mobile service requirements
- Adopted access control technologies to enable secure wireless network access to the mobile ward round system

Benefits

The solution provided the following benefits:
- Offered another network transmission mode. The integration of wired and wireless networks considerably improved the hospital's service quality
- Enabled wireless ward round services. Medical care personnel can easily access the electronic medical record (EMR) system, improving work efficiency
- Laid a solid foundation for the medical industry's mobile application implementation, promoting digital-based medical industry reform

TAHSMU e-Hospital Project

Background

Third Affiliated Hospital of Southern Medical University's (TAHSMU's) existing service system was outdated and could no longer meet service requirements.
TAHSMU needed a new comprehensive network solution that featured high reliability, real-time data transmission, easy expansion, and enhanced security protection.
TAHSMU also needed to upgrade its existing HIS, PACS, and LIS to maximize its return on investment (ROI).

Solution

To meet TAHSMU's requirements, Huawei developed network, security, and storage backup platforms with the following features:
- Used Huawei's high-performance core switch S9303 and S9306 in internal and external networks
- Deployed the USG5320 security gateways at the network egress and NIP200 attached intrusion detectors
- Employed Huawei's S5500 Fiber Channel Storage Area Network (FC SAN) as a centralized storage platform for the HIS and PACS

Benefits

The solution provided the following benefits:
- Upgraded the network structure and offered TAHSMU a highly reliable, scalable, and secure network that can meet service requirements for the next five years
- Improved the storage and backup systems of TAHSMU data centers, maximizing ROI
- Helped TAHSMU level up to a Class-3 Grade-A hospital (ranks second only to Class-3 Grade-Special hospitals in China)

Fujian Longyan People Hospital Medicine Cloud Project

Background

To promote its "e-Hospital" reform, Longyan People Hospital planned to deploy advanced ICT systems in its newly constructed building, such as the mobile ward round system, cloud desktop system, and cloud HIS.
The hospital required that the new ICT system accomplish the following:
- Integrate with service systems in existing buildings to enable service disaster recovery
- Support the migration of existing application systems, such as the HIS, LIS, PACS, and resident health system
- Provide cloud desktop services for medical care personnel

Solution

Huawei developed a data center in the new building and another in one of the existing buildings to provide disaster recovery and data backup services. Both data centers have cloud platforms, disaster recovery modules, and backup systems.

Benefits

The solution provided the following benefits:
- The cloud computing technologies seamlessly integrated with existing systems, substantially reducing total costs of ownership (TCO).
  - Hospital employees use TCs that feature eco-friendly design and low energy consumption, reducing annual power supply costs by 10%
  - Service integration reduced server and storage unit capital expenditures (CAPEX) by 30%
  - Unified system management and O&M improved system operation efficiency by 100%
- The implementation of virtualization and disaster recovery technologies significantly improved the hospital's medical service quality and efficiency.
  - The new system supports instant service recovery when network device failure occurs, while original systems required at least 2 hours.
  - The system can complete network switchover between the active and standby node within 15 minutes.