SGCC Electrifies Its Dispatching System with Huawei’s Servers

"Huawei’s servers have been applied in the SGCC dispatching system for a long period of time. Their high performance, stability, and reliability meet our service requirements. In addition, Huawei is a trusted solution provider who can provide fast after-sales service."

- Dispatching automation office, SGCC

**Executive Summary**

**Industry**
Electric Power

**Challenges**
Required a power grid dispatching system to deliver high security, compatibility, reliability, and performance.

**Huawei Solution**
- Deployed online service systems (such as SCADA and EMS) on Huawei RH2485 V2 servers.
- Deployed offline service systems service applications (such as DTS) on Huawei E6000 blade servers.

**Customer Benefits**
- High security
- Lowered TCO

**Introduction**

Founded in December 2002, State Grid Corporation of China (SGCC) is the largest state-owned electric utilities company in the world. SGCC serves 1.1 billion people in 26 provinces, autonomous regions, and municipalities in China, which equals to 88% of the country's territory.

**Challenges**

The power grid system is a critical part of the national infrastructure, and its stable operation is closely linked to people's livelihood and the economic health of the country. The power grid dispatching system is the “nerve center” of the entire power grid system, which ensures the secure, reliable, and economical operation of the power grid.

SGCC used a system called D5000 as the platform for the dispatching automation system. D5000 is a complex system that consists of servers, storage devices, network devices, operating systems, databases, middleware, and application software. D5000 provides a wide assortment of key services, including Supervisory Control and Data Acquisition (SCADA), Energy Management System (EMS), Operations Planning and Scheduling (OPS), Security Checking System (SCS), Operator Management System (OMS), and Dispatcher Training Simulator (DTS).

SGCC used an x86 server cluster to replace traditional midrange computer systems in the D5000 system to provide computing capabilities required by all SGCC key services. As the foundation of the D5000 system, the x86 server faced the following challenges:

**Security and compatibility:** SGCC concentrated on the security of servers that are the most fundamental computing platform. Since 2010, x86 servers running the secure Linux operating system provided the infrastructure platform for the power grid dispatching automation system. The Linux operating system was customized according to characteristics of the power grid industry. In this way, the server that functions as the computing platform must be highly compatible to run the customized Linux operating system.

**Reliability:** The server and storage device reliability directly affects the proper running of the key service systems such as the SCADA and EMS systems and the stable operation of the entire power grid. All dispatching automation devices must meet the reliability requirements of the Chinese government, which specifies that the average annual availability rate must be more than 99.99%, and the mean time between failures (MTBF)
must be greater than 25,000 hours.

**Performance:** The power grid dispatching automation system is a real-time processing system. The frontend communication server installed in the dispatching center needed to process a large amount of telemetry and telecommand data reported by the SCADA system. Additionally, the server runs key service systems (for example, EMS) which computed and analyzed the collected telemetry and telecommand data, to deliver remote control and commissioning instructions to substations. For example, according to the industry specifications released by the Chinese government, work status changes of substations must be reported to the dispatching center within 1s. In addition, the dispatching center must respond to dispatch tasks of higher priorities within 2s. For large-sized power grids, midrange computers were commonly used to meet computing requirements of dispatching tasks.

**Huawei Solution**

After analyzing SGCC's special requirements for IT devices, Huawei enhanced its cooperation with industry partners such as Beijing Sifang Automation Co. Ltd and Nanjing Nari-Relays Electric Co., LTD and set up special workgroups for clarifying customer requirements and designing solutions. After thoroughly analyzing the customers' requirements on D5000, Huawei proposed a system consisting of the RH2485 V2 4-socket server, E6000 blade server, and S5600T storage devices, and conducted technical tests in accordance with SGCC's requirements.

**RH2485 V2 4-socket server**

A variety of online service systems (such as the SCADA and EMS) were deployed on Huawei RH2485 V2 servers. Multiple RH2485 V2 servers were deployed in cluster mode to provide computing capabilities for D5000. An RH2485 V2 is 2U high and supports a maximum of four Intel E5-4600 CPUs and 1.5 TB memory, which provides high-performance and highly reliable computing capabilities for upper-layer service applications.

**E6000 blade server**

Offline service applications, for example, DTS, were deployed on Huawei E6000 blade servers. Each E6000 blade server provides space for 10 server blades in an 8U subrack. One subrack supported a maximum of 40 CPUs, which provides strong computing capabilities for DTS. In addition, the Huawei E6000 blade server also supports both GE and FC switching modules, which simplifies the system architecture and provides an integrated computing and network solution that satisfies DTS requirements.

As for the "x86 server + Linux operating system" infrastructure platform, Huawei servers can be adjusted and optimized based on customers' requirements, which greatly enhances the platform compatibility and ensures security of upper-layer service applications.

**Customer Benefits**

Huawei servers and storage devices have been widely used for the D5000 dispatching systems at SGCC and its subordinate provincial power companies.

**High security**

Huawei's servers leverage a variety of innovative technologies and customer-specific onsite optimization functions to ensure high security for the power grid dispatching system. Huawei's servers and storage devices have passed security and compatibility tests conducted
by third-party software.

**Lowered TCO**

Huawei's RH2485 V2 and E6000 have helped the customer reduce maintenance costs by 30% compared to similar products. Meanwhile, the high-density E6000 blade server decreases about 50% footprint and 10% energy consumption without compromising computing capabilities.

With continuous performance and reliability increase of x86 servers, the "x86 server + Linux operating system" infrastructure has become the mainstream architecture in the power industry. In recent years, Huawei has enhanced its cooperation with industry partners such as Beijing Sifang and Nanjing Nari-Relays to promote the application of Huawei's Tecal series servers in China's smart grid market.

Yu Bin, R&D Manager of Beijing Sifang, stated, "Because of x86 server's achievements in performance, reliability, cost-effectiveness, and technical service, the power grid dispatching system starts to deploy high-end x86 servers in batches instead of Unix servers. We have realized that x86 servers will be more extensively applied in the power industry, ranging from power grid dispatching systems to substations."