

CASE STUDY

Intel® Xeon® Processor E7-8800/4800 Product Families
Intel® Ethernet Converged Network Adapter X520 Series

Cloud Computing
Enterprise Reliability
RISC Migration
Communications/Media



Look Inside.™

Enhancing billing system efficiency with cloud computing

Migrating the billing system from RISC to Intel® architecture and harnessing the power of cloud technology enable China Mobile Shanghai to gain significant extension capacity, improve overall system performance, and reduce operating costs



“Migrating from an IBM Power* to an Intel® architecture-based solution gave our billing system better computing performance and more reliable operation. We were also able to boost overall performance by adopting a cloud computing-based solution based on the Intel® Xeon® processor E7-8800 and E7-4800 product families, and Intel® Ethernet Converged Network Adapter X520 Series.”

Cai Jiaqi

*Assistant to the General Manager
Information System Operation Department
China Mobile Shanghai*

The billing system is the most important IT business support system for China Mobile Shanghai. A stable and efficient billing system determines the efficiency and reputation of the company's business operations. With the continuous expansion of its 3G/4G business, China Mobile Shanghai has seen significant growth in its number of users. This user growth, combined with an increase in business services, has resulted in more billing items. At the same time, billing system users have higher requirements for real-time performance. China Mobile Shanghai acknowledges that the limitations of its IBM Power* architecture-based billing system—including computing performance, expandability, and cost implications—have directly impacted the efficiency and reputation of its business.

CHALLENGES

- **Support growing business demands.** Ensure a stable and reliable billing system to meet the needs of a growing number of users, rising business demands, and real-time business billing needs.
- **Improve business agility.** Enhance the expandability of the existing billing system to make it more agile in addressing performance and storage extension issues resulting from increasingly complex business needs.
- **Reduce operating costs.** Lower the cost of operating the billing system while ensuring better performance and stronger expandability to accommodate future business demands.

SOLUTIONS

- **Migrate to Intel® architecture-based platform.** Migrate the billing system from IBM Power to Intel architecture for higher computing performance and enhanced operation reliability.
- **Adopt a cloud computing solution.** Use Intel Xeon processor E7-8800/4800 product families to build an enhanced cloud computing platform that provides reliable performance and improved expandability.
- **Improve I/O performance.** Utilize Intel® Ethernet Converged Network Adapter X520 Series to enhance I/O performance and meet real-time billing needs.

TECHNOLOGY

- **Enhanced system performance.** Enhanced reliability, accessibility, and serviceability (RAS) with Intel Xeon processor E7 family and cloud computing technology enables a reliable billing system with enhanced performance and scalability.
- **Higher system throughput.** The new system successfully passed a stress test of 30 million users. With throughput up to 180,000 transactions per second (TPS)¹, the server processor utilization remained at around 70 percent.

BUSINESS VALUE

- **Improved business agility.** Migrating from RISC to an Intel architecture-based billing system provided stronger horizontal scaling capability to meet complex business billing needs.
- **Reduced operation cost.** Operating the Intel architecture-based system costs less than half as much as operating the RISC architecture, providing a more cost-effective solution to meet business needs.
- **Real-time billing and information control.** The new online billing system platform enables real-time billing and credit control and also helps reduce the number of arrears.

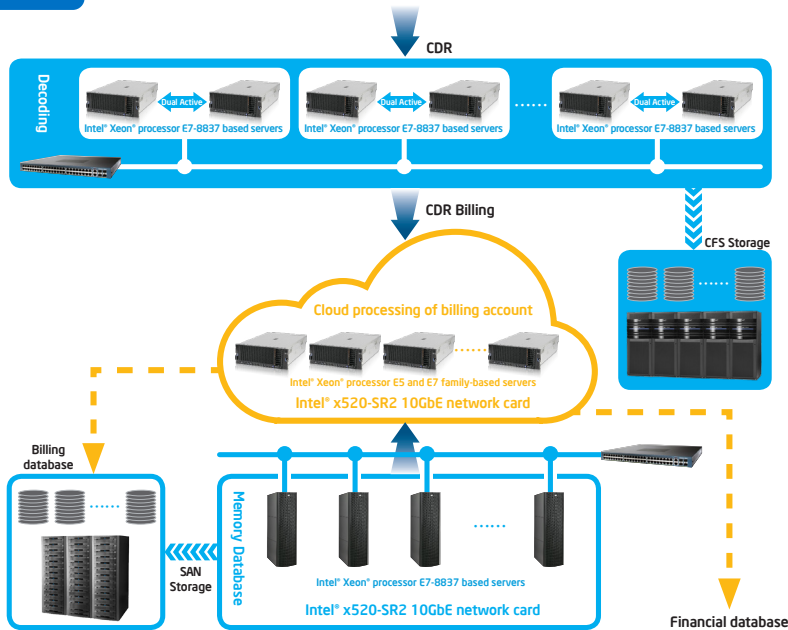
Increased business needs stress billing system

Emergence of various intelligent mobile terminals, as well as an increase in users that resulted in the explosive growth of data service bills, have posed new challenges to China Mobile Shanghai's billing system. Faced with fiercer market competition, the company needed to improve efficiency to support complicated business needs, improve service, and gain business opportunities.

An increasingly complex business mode puts more requirements on the billing system's performance. Explained Cai Jiaqi, assistant to the general manager of China Mobile Shanghai's information system operation department, “Take the charges package as an example. We provide users with a variety of packages that combine mixed voice calls and 3G/4G data connection. Since we are restricted by the limited operational performance of the billing system, users can only start to



With an Intel® architecture-based billing system, China Mobile Shanghai reduces operating costs while improving performance, system reliability, and expandability



Online Billing System Structure Chart

use a given service package a month after they purchase it. The billing has to be then implemented accordingly. Obviously, this type of billing cycle is a problem for users, who want to use the package as soon as they purchase it."

Users also expect their phone bills to be reflected in real time to accurately understand and control their call charges and allow China Mobile Shanghai to prevent malicious arrear and asset loss. However, a phone call or data connection has to undergo several calculation procedures before the corresponding charges are applied. China Mobile Shanghai needed an upgraded billing system with more power and scalability to meet these needs.

That meant upgrading the IBM Power-based billing system was cost prohibitive.

New system architecture delivers high performance

After comparative tests, China Mobile Shanghai decided to go with an Intel architecture-based platform to replace its existing billing system, which was based on the IBM Power architecture. Besides migrating to Intel architecture, China Mobile Shanghai also adopted a cloud computing solution by using servers based on Intel Xeon processor E7-

8800/4800 product families.

The billing system now gives China Mobile Shanghai a solid foundation to increase TPS, with enhanced system performance and billing efficiency and strong horizontal scalability.

"The Intel Xeon processor E7-8800 and E7-4800 product families provided enhanced RAS, enabled large memory support, and enhanced management and calibration functions while ensuring the stability of the cloud-based billing system's memory database. Test results showed the system was able to achieve a total data throughput of 180,000 TPS¹, which not only met our performance requirements but also significantly reduced our operating costs. Upgrading our previous RISC-based architecture would have cost us 2.6 times more than migrating to an Intel architecture-based platform," explained Cai.

Compared with the previous solution, the Intel architecture-based billing system can deal with a day's worth of phone bills that used to take about four days to complete. The new billing system also posts an impressive processor utilization rate of about 70 percent, with the pressure load of the servers at 40 to 50 percent at normal times, further ensuring reliability. Also, the previous one-to-one server redundancy has been switched to redundancy

LESSONS LEARNED

- Intel® architecture-based cloud computing solutions deliver the business agility to meet China Mobile Shanghai's growing business needs.
- The Intel architecture-based platform provides the performance, reliability, and stability mission critical applications demand in a cost-effective way.
- Intel® Ethernet Converged Network Adapter X520 Series can raise the data I/O capability of the system, reducing system delays and improving overall system performance.

supported by a cloud computing architecture, further strengthening security of the core data in the billing system.

Reducing system delay with billing cloudization

After the architecture migration, calculation on the application layer was changed from single-node to multi-node collaborative calculation based on cloud computing technology. Billing calculation tasks that used to be completed in one server can now be assigned to a dozen or even more server nodes. Using the Intel® Ethernet Converged Network Adapter X520 Series has helped substantially reduce data delay among the servers. The outstanding data throughput capability and reliability have enabled a smooth server upgrade in the application layer migration process..

"The Intel architecture-based billing system is providing horizontal scalability in both the data layer and the application layer in cloud computing mode. Based on its business needs, China Mobile Shanghai can harness this extension capability to bring in new servers as needed for the system to meet operational requirements," said Cai.

In the future, China Mobile Shanghai will continue its collaboration with Intel to explore performance potentials of the billing system, optimize its application performance, and provide users with better-quality services.

Find a solution that's right for your organization. Contact your Intel representative, visit Intel's Business Success Stories for IT Managers (www.intel.com/itcasestudies) or explore the Intel.com IT Center (www.intel.com/itcenter).

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All performance tests were performed and are being reported by China Mobile Shanghai. Please contact China Mobile Shanghai for more information on any performance test reported here.

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