SOLUTION BRIEF

AsiaInfo AISWare 5G Billing
2nd Generation Intel® Xeon® Scalable processors
Intel® Optane™ DC persistent memory
Telecommunications

Intel® Optane™ DC persistent memory Accelerates AsiaInfo Technologies' AISWare 5G Billing System and Drives Network Transformation for 5G

Intel® Optane™ DC persistent memory is integral to AsiaInfo Technologies' leadership in 5G billing system for next-generation telecommunications services.

AsiaInfo

Business Support System

Customer pain points:

- High DRAM cost for large-capacity (768 GB+) deployments
- Long execution time for complex queries

Why Intel® Optane™ DC persistent memory:

- Store more data close to the processor
- Reduce frequent accesses to disk

Value proposition:

- Lower latency/faster response times on complex queries

Compared with 3G/4G networks, 5G network has features such as high speed, low latency, and wide connectivity. Not only does it bring billions of IoT devices, but the 5G network also supports new applications such as augmented reality/virtual reality, fully connected self-driving cars, greatly expanding the scale of network services, and providing unprecedented terminal and data types. As the 5G network is gradually commercialized, the global telecom industry needs to make major changes to adapt to the fundamental shift in telecom services.

Another set of factors in the shifting market outlook is that business adoption of cloud and edge computing will continue to expand, putting further demands on the network. The founder of AsiaInfo Technologies, Tian Suning, says: "With the advent of the 5G era, we are transitioning from tens of billions to an era of trillions of connections, creating intelligent scenarios for connectivity. Operator networks need to be further innovated to help companies achieve rapid innovation and agile production."[1]

This massive expansion of data and new usage models will place new demands on billing systems, as reflected in market expectations that the global digital business supporting system market will grow from USD 2.8 billion in 2018 to USD 5.8 million by 2023, at a Compound Annual Growth Rate (CAGR) of 15.2 percent.[2]

AsiaInfo is helping drive that growth and rising to future challenges through billing system innovation that spans both software and hardware. AsiaInfo is China's leading business supporting system provider, offering IT solutions and services to Chinese telecom operators to help them respond quickly to market changes, reduce operating costs and increase profitability. At present, AsiaInfo Technologies' software solutions and services cover IP, VoIP, broadband, wireless, 4G and other technical areas, including business supporting systems, telecom value-added applications and carrier-grade network solutions.

AsiaInfo Technologies' integrated telecom billing products cover all major billing functions including billing, accounting, charging, settlement, etc. These products enable real-time management of billing-related activities for all end users, provide flexible pricing mechanism and memory database technology and support complex pricing and accounting services, enabling customers to offer innovative, personalized service packages to attract new end users and enhance the stickiness of existing end users. For the 5G billing scenario, AsiaInfo Technologies has launched the AISWare 5G Billing System, which enables multi-dimensional billing, equity sharing, SLA pricing, open capability realization, and multiple billing mode combinations. The billing and settlement object also shifts from the traditional thinking of people and things to the scene-centric billing object, thereby enabling the realization of 5G value through scene billing.

AsiaInfo has optimized its AISWare 5G Billing system for Intel® Optane™ DC persistent memory to reduce latency for better customer experience.

Tailoring Billing Operation to Meet Emerging Challenges

As the telecom industry continues to become more competitive, carriers must be judicious in their use of resources, including cost consciousness with regard to technology and equipment. This factor plays a significant role as carriers roll out or expand support for trends such as 5G, IoT, cloud, and edge computing. Particularly in the realm of billing server hardware, the increasing cost of DRAM complicates carrier efforts to balance cost and performance requirements.

Telecom billing servers are typically configured with large amounts of memory. The speed and capacity of the memory are critical to the efficiency of the billing servers. If the memory capacity is insufficient, the system delay and response time will increase, especially during complex queries for the billing system.

Enterprise-class high-capacity DRAM memory is expensive. To achieve the desired memory pool capacity, it will cost a lot of money, so it is difficult to achieve the total cost of ownership (TCO) control goal of the billing server. As a result, AsiaInfo is responding to this challenge by optimizing its AISWare 5G Billing system for Intel® Optane™ DC persistent memory.

"The combination of AsiaInfo AISWare 5G Billing and Intel® Optane™ DC persistent memory technology further enhances the system architecture of the next-generation billing system for 5G. In this PoC process, the system performance improvement and system resource saving brought by persistent memory have been well verified. We hope that in the follow-up exchanges and cooperation, we can further explore the application potential of the new scenarios, and jointly provide a cost-effective system solution for China Mobile's 5G business support and new business development."

– Ying Lijing
Chief Engineer of Mobile Billing R&D Solutions
Billing R&D of AsiaInfo Technologies

With lower cost and similar performance to DRAM, Intel® Optane™ DC persistent memory enables billing servers to be provisioned with a larger amount of total memory, without increasing system cost. Those expanded resources enable the server to store more data in memory, close to the processor, where it can be rapidly accessed for use in queries and computations. Greater capacity reduces the incidence of data spilling over and having to be written to and read from the disk, protecting those fast access times.

AsiaInfo AISWare 5G Billing system runs customer-facing business operations, for both traditional telecom services and modern digital ones such as over-the-top (OTT) content. It provides flexible, high-performance services that help providers manage customers, products, orders, and revenue effectively across operational categories, which include:

- **Customer types:** consumer and business
- **Payment methods:** prepaid, postpaid, and hybrid
- **Network connections:** mobile, fixed premise, and IP
- **Service types:** voice, data, messaging, and video

AsiaInfo collaborated with Intel during the development of Intel® Optane™ DC persistent memory to optimize the AISWare 5G Billing system for the new memory architecture. That work included the redesign of key aspects of the software framework. It also required development of benchmarking and testing techniques tailored to both hardware and software for accurate and flexible measurement of key performance indicators (KPIs) on systems equipped with Intel® Optane™ DC persistent memory.

Driving Up Responsiveness for Business Operations

Because the performance of AsiaInfo AISWare 5G Billing system is primarily bound by memory, it shows outstanding results with Intel® Optane™ DC persistent memory. Compared to a typical five year old billing server, a new system based on the 2nd Generation Intel® Xeon® Scalable processor equipped with Intel® Optane™ DC persistent memory enables great reduction in response time for complex queries. For new servers based on the 2nd Gen Intel® Xeon® Scalable processor, the addition of Intel® Optane™ DC persistent memory greatly reduces response time for AsiaInfo AISWare 5G Billing system compared to the same server with DRAM alone.

Intel® Optane™ DC persistent memory delivers industry-leading high throughput, low latency, high quality of service and exceptional durability, and provides near-memory latency, fast cache, fast storage and application acceleration. It performs well in accelerating applications.

In addition, Intel® Optane™ DC persistent memory has a maximum capacity of 512GB for a single device, far exceeding 128GB for DRAM memory, making it easier to achieve a larger total amount of memory on a single server. Moreover, Intel® Optane™ DC persistent memory costs far less than DRAM memory, which enables AsiaInfo to build higher capacity memory pools at lower cost and provide higher data throughput and lower latency.

By providing faster queries, AsiaInfo enables service providers to process more business data in less time, driving greater value from it. For example, by accelerating business intelligence operations, telecom operators can perform a larger number of more sophisticated analyses based on user data. That leads to a higher degree of insight that can direct day-to-day business operations with better decision making and helps carriers achieve a competitive advantage.

The increased performance sets the stage for additional features and capabilities, such as real-time monitoring of KPIs, personalized reporting, and value-added service analysis and push.

Ultimately, implementing AsiaInfo AISWare 5G Billing system on servers equipped with Intel® Optane™ DC persistent memory can help deliver a better user experience as well as significant cost savings.

"The conclusion drawn from the comprehensive laboratory test of Intel® Optane™ DC persistent memory technology and billing system service scenario shows that Intel® Optane™ DC persistent memory technology can break the bottleneck of billing service support system for large memory and high-performance storage scenarios, thus improving the overall throughput of the system. As a new hardware solution, Intel® Optane™ DC persistent memory is possible to become a cost-effective system solution through the optimization of more application scenarios and the improvement of business integration solutions in the future."

Business Support Department
A provincial branch of China Mobile

Redefining the Enterprise Memory Tier

Beyond its cost advantages over DRAM, Intel® Optane™ DC persistent memory provides profound changes to the architecture of the memory subsystem, making it the primary data tier for both working data and long-term storage. That is, it combines byte-addressability similar to DRAM with persistence similar to storage. That combination means that it can be mapped directly into application address space, eliminating the bottleneck associated with reads and writes to conventional storage.

Intel® Optane™ DC persistent memory offers two distinct operating modes: Memory Mode and App Direct Mode. In Memory Mode, it behaves exactly like ordinary, volatile (non-persistent) system memory but with lower cost, enabling higher capacities within a constant system budget. Modules are available in capacities of 128 GB, 256 GB, and 512 GB.

AsiaInfo unlocks even greater value from Intel® Optane™ DC persistent memory by enabling App Direct Mode. This approach makes separate volatile and persistent memory stores available to the billing application. The software can place large data structures and data that must be retained long-term on Intel® Optane™ DC persistent memory, accelerating operations using a data caching structure based on conventional DRAM. This arrangement enables AsiaInfo AISWare 5G Billing system to tailor the memory subsystem to the individual needs of the workload, further enhancing performance.

The performance advantages of Intel® Optane™ DC persistent memory are complemented by those delivered by the 2nd Gen Intel® Xeon® Scalable processor. With up to 28 cores and six memory channels, the processor provides pervasive performance in the data center and can be equipped with as much as 6 TB of total system memory. This combination of hardware components represents engineering across the hardware stack that delivers higher performance than predecessors, both for AsiaInfo and across the enterprise.

When Intel® Optane™ DC persistent memory is used in Memory Mode, it can maintain the processing speed of physical memory. For scenarios requiring low CPU consumption, more applications can be deployed under large memory mode. When it is used for big cache and memory database scenarios, it will result in higher benefit ratio.

When Intel® Optane™ DC persistent memory is used under the Storage over App Direct Mode, it has remarkably high IO capability, overall call detail record processing performance, and system throughput, and therefore can result in significant performance improvement. At the same time, it also can reduce CPU consumption to a certain extent.

"With high capacity, low cost, and persistent storage, Intel® Optane™ DC persistent memory delivers significant performance gains for applications such as big data analytics and in-memory databases. It can reduce IT costs and simplify infrastructure for users. Intel® Optane™ DC persistent memory is becoming the best solution for building next-generation data centers and data analytics platforms. We see the AsiaInfo AISWare 5G Billing system with Intel® Optane™ DC Persistent Memory and Inspur NF5280M5 server have achieved significant performance gains while significantly reducing deployment costs."

- Wei Jian
Deputy General Manager, Solutions and Testing
Inspur Electronic Information Industry Co., Ltd.

Effect: laying the foundation for future-oriented billing system

5G technology brings about the wide connection between people, people and things, things and things, and promotes the implementation of Internet of Things and edge computing. For telecom billing systems, the types, categories and quantity of equipment involved in telecommunications costs will increase substantially, which means huge challenges and an important business opportunity. In the fast-developing 5G era, AsiaInfo hopes to be able to orchestrate the operator network and services in terms of technology, and empower operators and vertical industries in terms of business model. It is innovating in billing systems for the 5G era.

With Intel® Optane™ DC persistent memory, AsiaInfo can help operators quickly process billing services while controlling the cost of the billing system servers in the rapidly growing billing system load. In a large number of scenarios, the calculation of voice, traffic and other expenses can be quickly processed, and the entire system can be accounted for within one day, which resolves the contradiction between the explosive development of the business and the insufficient carrying capacity of the IT infrastructure.

Due to the improved performance of AsiaInfo's AISWare 5G Billing servers, billing efficiency is guaranteed, providing customers with comprehensive, timely and friendly service capabilities and service channels to ensure a good customer experience. At the same time, AsiaInfo's AISWare 5G Billing servers can effectively support the timely launch of various traditional businesses and traffic services, ensuring that telecom operators are in a favorable position in the highly competitive market.

Looking ahead to the future, AsiaInfo is working with Intel to extend its billing performance advantages even further. The company began trading publicly on the Hong Kong stock exchange in December, 2018. The capital raised from the IPO allows AsiaInfo to enhance its research and development capabilities, helping the company continually ensure that its billing system takes optimal advantage of emerging technologies.

Conclusion

With the acceleration of the 5G era, telecom service providers are facing tremendous development opportunities, and their information support systems are also facing severe challenges. Companies such as AsiaInfo, Inspur, and Intel are accelerating business cooperation and technological innovation, helping telecom operators to organize their networks and services to meet the urgent needs of 5G.

AsiaInfo AISWare 5G Billing system uses the redesigned memory architecture provided by Intel® Optane™ DC persistent memory technology to keep pace. Lower system latency provides faster response times on complex billing queries against these novel data sets. These advances will help carriers and other service providers thrive on change instead of struggling to accommodate it.

To learn more about this solution, please visit:
https://www.asiainfo.com/en_us/content_2285.html

Take the Next Step

Learn more about Intel® Optane™ DC persistent memory:
www.intel.com/optanedcpersistentmemory

Learn more about Intel® Xeon® processors:
www.intel.com/xeon

Contact AsiaInfo sales or sign up for a free trial:
5G@asiainfo.com

Solution Providers:

AsiaInfo 亚信科技 5G 原力进化 inspur 浪潮 intel

[1] Standard & Poor's Global Market Intelligence, "Chinese telecom provider AsiaInfo Technologies preps for 5G ahead of IPO," https://www.spglobal.com/marketintelligence/en/news-insights/trending/kioj0lviutcjws6aj0stja2

[2] PR Newswire, "Global Digital Business Support System (Billing) market size to grow at a CAGR of 15.2%," https://www.prnewswire.com/news-releases/global-digital-business-support-system-Billing-market-size-to-grow-at-a-cagr-of-15-2-300763635.html

[3] All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest Intel product specifications and roadmaps.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Learn more at intel.com, or from the OEM or retailer.

Intel processors of the same SKU may vary in frequency or power as a result of natural variability in the production process.

For more complete information about performance and benchmark results, visit www.intel.com/benchmarks

Performance results are based on testing and may not reflect all publicly available security updates. See configuration disclosure for details. No product can be absolutely secure.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and Mobile Mark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to http://www.intel.com/performance/datacenter

Optimization Notice: Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice. Notice Revision #20110804.

0219/RA/MESH/PDF 338339-001US