

Increasing throughput performance for a content delivery network

Intel® Ethernet Converged Network Adapter X520 enables Qing Niu Technology to build a new-generation high-performance content delivery network (CDN)



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“With the high throughput provided by Intel® Ethernet 10 Gigabit Converged Network Adapter, our new generation of CDN streaming servers has increased the concurrency of our equipment by three times while hardware costs remain almost unchanged. Now our equipment can serve more users, while the single-line user cost has been reduced significantly and competitiveness of the products has been enhanced effectively.”

Ma Jun
Chief Engineer
Qing Niu (Beijing) Technology Co., Ltd.

Founded in 2000, Qing Niu (Beijing) Technology Co., Ltd., a leading Chinese enterprise video cloud services provider (SaaS), provides technology research and product development for integrated network and video. Qing Niu integrates the CDN system to help enterprises deliver content rapidly to their end users. Deployed on the Internet via a telecommunication-dedicated network or heterogeneous network, Qing Niu's services include Web page browsing, download acceleration, and video acceleration for PC, TV, and various mobile devices. With 28 branches and an established service system, Qing Niu's products are widely used in key industries such as telecommunications, finance, government, logistics, and life services.

CHALLENGES

- **Increase CDN throughput to meet the demands of increasing network resources.** Build a more powerful CDN with stronger streaming capabilities to meet the requirements of growing network resources, thereby avoiding network congestion and server overload to serve the needs of operators who offer interactive digital media services such as IPTV more effectively.

SOLUTIONS

- **Deploy a streaming solution with Intel® Ethernet 10 Gigabit Converged Network Adapter X520.** Deploy a new generation of CDN with streaming service equipment as the core, enabling Qing Niu to effectively deliver data services for all levels of Internet node and terminals with high concurrency and high throughput.

IMPACT

- **Form a unified content delivery system with multi-terminal services and multi-business integration.** Support multi-level networking, heterogeneous interconnection, Web acceleration, and point-to-point acceleration with a new generation of CDN, providing strong content delivery services for businesses such as over-the-top content (OTT), IPTV, and Internet video, delivering better service for end users and increasing the competitive advantage of Qing Niu's customers.

With the continuous enrichment of Internet content, CDN is playing an increasingly important role in enabling an enhanced online experience. For businesses, CDN not only offers acceleration for the traditional Web page browsing and downloading, but also supports acceleration for live video, video-on-demand (VOD), and broadcast recording. For various communication and media terminals, it supports the traditional PC, mobile phones, tablets, and TVs. CDN has permeated every aspect of people's Internet lives.

Businesses need high bandwidth and consistent quality of service (QoS). Technologies such as newly emerging Internet protocol television (IPTV) have severely challenged existing CDN, affecting the user experience due to gaps in QoS management and transmission delays. Key CDN providers are actively engaged in CDN

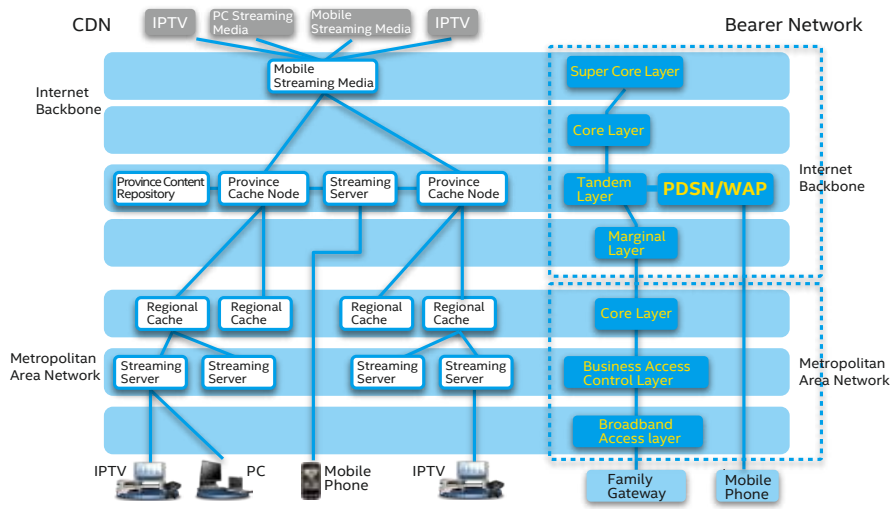
network development to address this issue. As the industry's leading CDN provider, Qing Niu has built a new generation of CDN that looks to deliver a unified content delivery system to support multi-terminal services and multi-service integration.

Enabling high throughput for high-performance CDN

To meet the stringent requirements of next-generation servers, Qing Niu deployed servers running on the Intel® Xeon® processor and Intel Ethernet 10 Gigabit Converged Network Adapter X520 to enhance its CDN streaming server.

According to Ma Jun, chief engineer at Qing Niu, Intel Ethernet 10 Gigabit Converged Network Adapter provided benefits to the CDN streaming server (i.e., the receive-side scaling [RSS] and flow director technology) as well as the compatibility of

With the Intel® Ethernet 10 Gigabit Converged Network Adapter X520, Qing Niu builds a new generation of CDN streaming servers to increase its concurrency by three times, delivering benefits for its customers



Qing Niu Technology CDN System Architecture

the non-uniform memory access (NUMA) architecture. These two benefits allowed the CDN streaming server to greatly increase its performance. Test data showed that compared to the last generation of streaming servers, the new CDN streaming server improved streaming capability by more than three times.

When the traditional network adapter processes the network data packet, it usually processes one network data packet with each I/O interrupt raised to the processor. But with a huge amount of network data, the processor must handle heavy loads. In viewing live video via IPTV, for example, the video streaming transmission bandwidth may be over 800Kb/s (DVD level). In this case, several hundreds of interruption events may be triggered between the server and the network adapter, bringing huge processing pressures to the streaming server. The Intel Ethernet 10 Gigabit Converged Network Adapter provides RSS plus Intel® Ethernet Flow Director, which can deliver the data received by the adapter to several data queues and map to multiple processing cores. It can also increase the number of transmission queues to over 64. Each of the CDN streaming servers is configured with two eight-core Intel Xeon processors. The multiple queues built by the RSS technology

help the CDN streaming servers balance loads and maximize the processor core utilization rate.

NUMA architecture further improves memory performance. In the NUMA shared memory architecture, each processor has its own local memory module that it can access directly with a distinctive performance advantage. At the same time, it can also access any memory module belonging to another processor using a shared bus. With NUMA architecture, the CDN streaming server can allow a data stream to be processed within a NUMA node, thus reducing the extra latency that happens as the data is transferred across nodes. Unnecessary processor resource utilization has also been reduced as a result.

Qing Niu's new generation of CDN streaming server uses Intel® architecture, with its configuration of two Intel Xeon processors E2670, 128G memory, and two Intel Ethernet 10 Gigabit Converged Network Adapters, which are configured as a main adapter plus a backup adapter. Tests performed by Qing Niu showed that the single equipment streaming throughput can reach as high as 18Gbps, with 20,000 user concurrent visits, an average response time of less than 20 minutes, a maximum

LESSONS LEARNED

- By placing server nodes at multiple locations across the Internet, the CDN constructs a layer of intelligent virtual network serving Internet users. Based on information such as network traffic, the connections of each node, the loads and distance to the user, and the response time, the CDN can redirect the user's request to the nearest server node in real time. The goal is to allow the user to access the contents in the nearest node, which can ease network congestion and improve response time for accessing the website.
- Qing Niu's next-generation CDN network is built to handle extreme demands with enhanced server throughput and stability. Intel® Ethernet 10 Gigabit Converged Network Adapter X520 performs well in virtualized server environments, bringing functional flexibility and performance reliability. It effectively meets the stringent requirements of the new generation of CDN.

response time of less than 90 minutes, and CPU occupancy of only 20 percent.

With such an impressive result for its CDN streaming server, Qing Niu will continue to work with Intel, which, with its Intel architecture, will constantly optimize its CDN, ensuring sustainable development of the applications it provides to users.

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 Qing Niu (Beijing) Technology Co., Ltd. Please contact Qing Niu (Beijing) Technology Co., Ltd. for more information on any performance test reported here.

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