NYSE EURONEXT CHOOSES JUNIPER NETWORKS FOR LOW LATENCY ACCESS TO NEXT-GENERATION GLOBAL TRADING DATA CENTERS AND WAN

Summary

Company: NYSE Euronext

Industry: Financial Services

Challenges: Support growing trading volumes by consolidating data centers and building state-of-the-art data centers and WAN that would deliver ultra-reliable, predictable performance at very low latency.

Selection Criteria: Data-center and wide-area network must deliver ultra-high performance, reliability, predictability and extremely low latency. Confidence in Juniper Networks' engineering expertise was also a key factor.

Solution:

- EX Series Ethernet Switches
- MX Series 3D Universal Edge Routers
- Professional Services

Results:

- Executes billions of transactions and quotes per day on the world's most liquid stock exchange
- Decreased internal roundtrip latency from 150 microseconds to 50 microseconds
- 3-2-1 data center infrastructure simplifies architecture

When the opening bell rings on one of the world's busiest stock exchanges, traders and their customers don't think twice about the underlying network. They simply expect that their trades will execute at lightning-fast speeds, as the moments between when an order is placed and when it is fulfilled are critical. As execution time increases, the potential for the market to move and for the exchange to deliver an unexpected outcome can increase. The market quality of NYSE Euronext's exchanges depends largely on its ability to complete trades as fast as possible for clients across multiple financial markets and geographies.

NYSE Euronext is one of the world's leading and most liquid exchange operators. It comprises equities and derivatives exchanges across the United States and Europe. These markets trade a range of products, including cash equities, futures, options, fixed-income and exchange-traded products. The NYSE Euronext equities market has more than 8,000 listed issues globally and executes approximately one-third of the world's equity trading volume, more than any other exchange group.

Challenges

Electronic trading has changed the way markets function, and the role of an exchange must evolve to meet massive trading volumes and message traffic. NYSE Euronext has long been known for providing its member brokers with extremely high-speed, low-latency trading platforms with a response time that's consistent across billions of daily transactions.

Realizing the future meant that NYSE Euronext had to plan for levels of speed and scale that can scarcely be imagined today. Steve Rubinow, executive vice president and CIO, NYSE Euronext, had a bold vision—to decrease internal roundtrip latency from 150 microseconds to 50 microseconds. A blink of an eye is 350,000 microseconds.

NYSE Euronext developed next-generation data centers that would meet its stringent requirements for high performance, extraordinary reliability, low latency, and trading predictability. NYSE Euronext is consolidating 10 data centers into four global data centers.

Selection Criteria

NYSE Euronext needed a state-of-the-art, ultra-low latency core network to support its global data centers. NYSE Euronext considered new approaches to designing the data center network core to meet its business requirements, and it concluded that the only way to reduce internal latency sufficiently was to innovate in ways that no other exchange operator has before. The Big Board needed to move from a traditional, three-tier network architecture to two tiers, and eventually, to just one. Legacy thinking simply would not allow the exchange to meet the rising volumes of a global exchange business.

NYSE Euronext chose to innovate with Juniper Networks. "Our business can grow in leaps and bounds with absolutely no warning, so Juniper Networks makes sense to us," says Rubinow.

The challenge of building next-generation trading platforms required unprecedented levels of cooperation among network, compute and storage engineers from NYSE Euronext and technology suppliers such as Juniper Networks. NYSE Euronext worked with Juniper Networks Professional Services to select the systems integrators for the new data centers. Verizon Business was the system integrator for the U.S. data center and IBM Global Services was the integrator for the U.K. data center.

Juniper Networks Professional Services worked closely with the technology and business executives at NYSE Euronext to define the roles and requirements during the staging, testing, deployment, configuration and turn-up of the networks. Juniper Networks Professional Services also worked closely with NYSE Euronext to provide planning and design consulting for the project.

The Big Board has used Juniper Networks routers in its WAN for nearly a decade, and Juniper's routing platforms had proven to be high-performance and carrier-class. Juniper's strong economics for data center switching allowed the Big Board to break free from a legacy architecture to create a new paradigm in data center operations.

"Juniper Networks' simplified data center approach allows us to deploy a complete 10 Gigabit Ethernet network with ultra-low latency at substantial cost savings. We have worked with Juniper Networks to develop truly unique and innovative technologies that help us deploy a very high capacity, low latency network that meets the stringent demands of the new data center."

Steve Rubinow,
executive vice president and CIO, NYSE Euronext

NYSE Euronext selected Juniper Networks® EX Series Switches for the stability, reliability and high performance of Juniper Networks Junos® operating system, which, along with a 3-2-1 architecture, and Juniper's strategy for migrating from three tiers to two tiers to a single, flat network, allowed the exchange to break through to new low levels of latency. NYSE Euronext executives were confident that the Juniper Networks switching solution was flexible enough to evolve as the exchange evolves.

Throughout the evaluation and proof-of-concept testing, NYSE Euronext was bullish on the engineering partnership and relationship with Juniper Networks. NYSE Euronext appreciated the ability to interact directly and easily with Juniper's engineering staff to solve particularly difficult challenges.

Solution

NYSE Euronext built out state-of-the-art data centers in the greater New Jersey and London metropolitan areas. The data centers are 10-Gbps at the core, and are interconnected to the world with multiple 100-Gbps fiber transport links. These data centers join existing data centers in New York and Paris.

"The more network hops there are, the more latency and the more jitter there is," says Andrew Bach, senior vice president of Network Services, NYSE Euronext. "Juniper Networks has allowed us to flatten our network and take essentially one hop out of our network, so we have a much flatter, and hence a faster, network."

NYSE Euronext uses Juniper Networks EX8200 line of Ethernet switches at the core, which are purpose-built to deliver wire-speed performance, low latency, carrier-class reliability and scalability. The EX8200 line of modular Ethernet switches offers flexible, modular platforms that deliver the port densities, scalability, and high availability that are necessary in demanding data center and campus core environments.

Top-of-rack Juniper Networks EX4200 Ethernet Switches and EX2500 Ethernet Switches provide access connectivity to the data centers' high performance services with 10GbE ports that deliver wire speed throughput. The EX4200 line of Ethernet switches include Juniper Networks' Virtual Chassis technology, which allows up to 10 interconnected switches to operate as a single, logical device. With Virtual Chassis technology, the EX4200 delivers a high-performance, scalable solution for data center and campus environments that combines the availability and reliability of modular systems with the economics and flexibility of stackable switches.

The EX2500 line of Ethernet switches delivers a compact, energy-efficient solution for 10GbE top-of-rack data center access deployments where high performance, low latency and high availability are key requirements.

For the high-performance WAN connecting its global data centers, NYSE Euronext uses Juniper Networks MX960 3D Universal Edge Routers. NYSE Euronext uses the MX Series' MPLS network virtualization, traffic engineering, low-latency multicast and carrier-class reliability features for highly reliable, high-performance connectivity.

Results

Long recognized as a premier exchange operator and growing technology solutions vendor, NYSE Euronext maintains its international leadership by aggressively adopting new and more efficient technology. Its next-generation data centers once again set a new standard in performance and innovation.

"Juniper Networks' simplified data center approach allows us to deploy a complete 10 Gigabit Ethernet network with ultra-low latency at substantial cost savings," says Rubinow. "Juniper Networks has developed truly unique and innovative technologies that help us deploy a very high capacity, low latency network that

meets the stringent demands of the new data center. With Juniper Networks, we are able to dramatically cut the cost and complexity of managing our data center today, while continuing to enhance our competitive position with a next-generation data center fabric that will enable us to scale to tens of thousands of 10GbE ports. With such an elastic and efficient infrastructure, we can provide enhanced functionality to our customers at unmatched scale while minimizing total cost of ownership."

Juniper Networks has enabled NYSE Euronext to meet its exacting standards for performance, reliability and latency. Juniper Networks' 3-2-1 architecture has also helped NYSE Euronext to meet its internal network roundtrip latency of 50 microseconds. The simplified data center network design requires fewer devices and interconnections, which has led to improved efficiencies in space, power, cooling and management.

Running Junos OS, a single source operating system that integrates routing, switching, security and network services, allows the NYSE Euronext network administrators to quickly and cost-effectively keep up with changing business demands and easily customize new services. IT can leverage Junos operating system's secure programming interfaces and the Juniper Networks Junos® SDK to create customized scripts and applications that unlock more value from the network. With Junos OS, NYSE Euronext network administrators can quickly and cost-effectively keep up with changing business demands and easily customize new services and applications.

Next Steps and Lessons Learned

While NYSE Euronext has unique ultra-low latency requirements, other businesses that can link financial performance to network performance will find common ground. The value of collapsing the core of the data center network, in terms of lower latency and heightened performance is clear—and also can be measured by capital and operational savings.

For More Information

To find out more about Juniper Networks products and solutions, visit **www.juniper.net**.

About Juniper Networks

Juniper Networks is in the business of network innovation. From devices to data centers, from consumers to cloud providers, Juniper Networks delivers the software, silicon and systems that transform the experience and economics of networking. The company serves customers and partners worldwide. Additional information can be found at **www.juniper.net.**

Corporate and Sales Headquarters
Juniper Networks, Inc.
1194 North Mathilda Avenue
Sunnyvale, CA 94089 USA
Phone: 888.JUNIPER (888.586.4737)
or 408.745.2000
Fax: 408.745.2100
www.juniper.net

APAC Headquarters
Juniper Networks (Hong Kong)
26/F, Cityplaza One
1111 King's Road
Taikoo Shing, Hong Kong
Phone: 852.2332.3636
Fax: 852.2574.7803

EMEA Headquarters
Juniper Networks Ireland
Airside Business Park
Swords, County Dublin, Ireland
Phone: 35.31.8903.600
EMEA Sales: 00800.4586.4737
Fax: 35.31.8903.601

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