BROCADE VIRTUAL TOP-OF-RACK SOLUTIONS

DATA CENTER

Simplify Data Center Architectures with the Brocade Virtual Top-Of-Rack Solution

HIGHLIGHTS

The Brocade® virtual Top-of-Rack (vToR) solution increases reliability and reduces latency, cabling, and management overhead. By collapsing the access and aggregation layers into a single aggregation layer, which also reduces failure points in the network, this solution offers increased:

- Reliability, resiliency, and availability
- Buffering to ensure optimal congestion management
- Operational simplicity

Brocade MLX Series of Ethernet routers provide:

- Wire-speed, non-blocking performance
- Optimum flexibility with 4-, 8-, 16-, and 32-slot chassis and many port options
- Hitless failover and upgrade and graceful restart
- Advanced, scalable software features, including advanced virtualization with multi-VRF and sFlow for granular network traffic accounting
- Best-in-class power efficiency and rear exhaust airflow on all MLXe models
- Comprehensive suite of advanced traffic management and Quality of Service (QoS) traffic prioritization

While the technology for virtualization is not new, the scale at which it is being deployed is unprecedented. The concept of a virtualized data center means that every aspect of every piece of hardware is abstracted from every other piece of hardware. In a virtualized server environment, for example, applications migrate from one physical server to another when predetermined performance and power thresholds are met. Since Virtual Machines (VMs) can move anywhere in the network, virtual Top of Rack solutions based on line-rate, low-latency architecture, retains network visibility by keeping workloads within a single pair of switches.

CHALLENGES IN THE VIRTUALIZED DATA CENTER

The virtual data center, however, creates its own set of problems that includes server sprawl, capacity and resource allocation, and lack of effective management tools. While new VMs are easy to create, they're difficult to keep track of. Additionally, virtualization impacts the access layer of the network when VMs move from one server to another, shifting network bandwidth and increasing I/O traffic. Also, resiliency becomes more critical as each link and node supports more applications than before.

Many existing access-layer architectures have some drawbacks in large, virtualized data centers. Multiple network layers and devices increase management complexity.

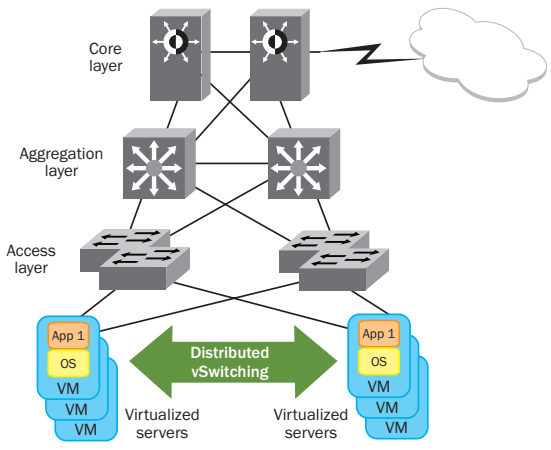

Figure 1.
Network access layer moves to the server.

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In addition, since traffic may need to traverse from the access to aggregation layer for server-to-server communications across racks, a greater number of Spanning Tree Protocol (STP) instances may be required.

Resiliency is another issue with an access-layer architecture. It is difficult to perform a software upgrade of a large number of switches at the same time without downtime. The large number of switches results in increased points of failure. And when a node or link does fail, slow control plane failover results in lost traffic and application availability.

Other drawbacks include limited buffer memory to handle higher workloads and bursty traffic, oversubscription ratio for server-to-server or server-to-network communications, and latency when traffic has to traverse aggregation layer (multiple hops).

The Brocade vToR solution attempts to solve these problems by extending the reach of Brocade MLX Series End of Row (EoR) routers to the top of rack through MRJ-21-based 10/100/1000 line cards. Such a solution is highly resilient and simple to manage, with line-rate performance and low latency.

THE BROCADE vTOR SOLUTION

As shown in Figure 2, MRJ-21 patch panels are installed for virtual ToR connectivity: 8 x MRJ-21 connectors with 6 x RJ45 connectors for each MLX line card and up to 1,536 1 GbE ports per Brocade MLX 32-slot chassis. There is now a direct connection from servers to the Brocade MLX, which reduces cabling, latency, and management overhead. With Multi-Chassis Trunking (MCT), all links are active resulting in full network use, instantaneous link or node failover and simpler network design where no STP is needed. In addition, this solution offers increased reliability, high availability, and no oversubscription—while retaining ToR modularization—and there is no active switch to manage at the top of rack.

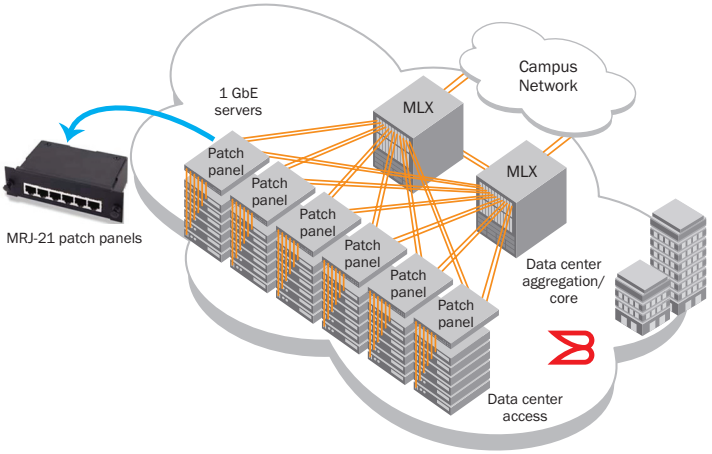

Figure 2. Brocade virtual ToR solution.

This highly resilient solution is ideal for IT groups looking to adopt cloud-based computing in the data center. Line-rate performance with no oversubscription allows cloud-based workloads to migrate anywhere, while still remaining within the domain of a single pair of switches, with no degradation in performance.

THE BROCADE ADVANTAGE

The Brocade MLX Series has a number of advantages over the competition, some of which are listed below:

- Massive consolidation and elimination of the "interconnect tax"
- Highest number of ports per LAG, efficiently aggregating a large number of 10 Gigabit Ethernet (GbE) links across the data center and enterprise backbones
- Multi-Chassis Trunking with all links active resulting in higher network performance, simpler design, and greater resiliency
- Complete separation of data plane and control plane for high availability
- Scales from 1.92 Terabits per second (Tbps) to 15.36 Tbps to meet growing bandwidth demands
- MPLS available today for high-end data centers and campus LANs
- All capabilities supported on every model (full IPv4, IPv6, L2, Multi-VRF)
- Proven with customer deployments over the three years since it was launched
- Field upgradeable network processor architecture for investment protection
- 8,000 policers for every 10 GbE module for efficient enforcement of rate limits

For next-generation architectures, the Brocade MLX supports Data Center Bridging (DCB) and 100 GbE. With the lowest power consumption per 10 GbE port and rear exhaust airflow on all Brocade MLXe chassis, the Brocade MLX Series joins many other Brocade platforms in the green section of the data center.

ABOUT BROCADE

Brocade connects the world's most important information—delivering proven networking solutions for today's most data-intensive organizations. From the data center to high-performance Ethernet networks, Brocade is extending its near-fifteen-year heritage as a leading innovator of advanced storage and networking technology. For more about Brocade IP products, visit www.brocade.com.

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