

Why Your Virtual Data Center Needs a Cloud-Optimized Network

By Drew Robb

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Both cloud computing and virtual data centers rely on a networking foundation that provides the “enabling” layer for server and storage virtualization. Establishing a cloud-optimized network can, therefore, help your business get the most return on its virtualization investment.

Network Requirements

Both data center virtualization and cloud computing require a flexible, high-speed network that provides point-to-point connections between the computing and storage resources. This applies whether the connection is to a public or a private cloud.

Looking first at speed, it is not just raw throughput that matters, but latency. This is where most data centers fall down. Even with multi-gigabit connections, Ethernet is still a hierarchical structure, using Spanning Tree Protocol to go from one switch or network segment to another. Each hop slows down the connection. This internal latency, added to the latency caused by accessing cloud resources outside the data center, greatly slows response times. Ideally, therefore, both the cloud and virtual data center should have a flat network structure allowing direct connections between each of the resources, no matter where they are located.

A second factor is the need to transfer large amounts of data in near real time. This includes streaming video and audio conferencing that require persistent connections, replicating data between data centers and shifting multi-gigabyte virtual machines around the data center to best allocate resources to meet changing needs.

“Nine out of 10 companies have at least a portion of their server infrastructure virtualized and we also see storage virtualization coming on strong. Virtualization is a stepping stone to the cloud.”

Laura Didio
Principal Analyst,
Information Intelligence Consulting

“Cloud computing and the virtual data center both work on the concept that all IT resources are virtual and located in pools that you can access whenever you need them. The cloud, in some ways, is the ultimate manifestation of virtualization.”

Zeus Kerravala
Principal Analyst,
ZK Research, Boston, MA

“A public cloud assures that perimeter protection isn’t going to be good enough for network security and a private cloud creates requirements for very high-speed connections between the server resources wherever they are located so that workloads can be moved real time. Both force a re-evaluation of network policies and a reset of guaranteed classes of service to assure performance.”

Rob Enderle
Silicon Valley analyst

Here, again, Ethernet is lacking because it only allows a single connection to exist between two switches at a given time, so a large transfer can tie up both switches until completed.

Then there is the matter of resource location. Both cloud computing and virtualization operate on abstracting the service from the hardware, but Ethernet switches are designed to send a known type of traffic between two known ports. For cloud computing, the switches need to be able to discover where virtual machines and other resources lie and know what policies and protocols to apply, even as those resources move from one physical location to another.

A cloud network should also be self-repairing, just the way the Internet can route traffic around broken or congested links.

Finally, the network should utilize familiar technologies that don't require a lot of additional training to put in place.

Switching to a Network Fabric

While that is quite a list of requirements, there is a networking technology that is ideal for both: Ethernet fabric switching.

"Ethernet is the gold standard and still king," says Didio. "It is compatible with everything, everybody is familiar with it, and most people have a lot of experience with it."

Unlike standard Ethernet, however, Ethernet fabrics incorporate the later technologies of fabric switching originally developed for storage area networks.

Installing such a network eliminates Ethernet's shortcomings. The fabrics get rid of Spanning Tree Protocol and eliminate the hierarchical structure that slows down traffic. They route traffic along the fastest available route and eliminate bottlenecks. The fabrics are self-repairing and self-configuring, boosting reliability and scalability without the need for constant intervention from support staff.

Ethernet fabric provides the right architecture to support cloud computing and a virtual data center, but there is one caveat. It is a different architecture and does require careful planning, not just dropping a new switch into the rack. The process starts with a careful inventory of the current infrastructure and services and then deciding what type of services architecture one wants to put in place: virtual data center, private cloud, hybrid cloud, or some sort of mix that also incorporates earlier designs. How much of the cloud is going to be outsourced and how much managed internally? What service levels are going to be acceptable and how much control are you willing to give up to an outside firm? What security risks are involved?

"In a cloud-optimized network you have a very flat, simple network. Virtual workloads tend to be very large, very latency sensitive, and the idea is to be able to move one of those big workloads across the network as fast as possible."

Zeus Kerravala
Principal Analyst,
ZK Research, Boston, MA

"In building a private cloud you are likely to be using a lot of virtual resources, which are going to generate a lot of east-west traffic. In that case you will want to use more of a fabric architecture. You want to completely re-architect how the data center network was designed so that the traditional model of multitier, multi-layer goes away and you move to a flat simple network."

Zeus Kerravala
Principal Analyst,
ZK Research, Boston, MA



“For a company to fully vet itself on clouds, it will have to do some broad, deep due diligence,” says Didio. “The data doesn’t just reside with one person like the CIO or CTO but will be spread out in the organization.”

Once that due diligence is completed and one knows what services will stay in house, it is time to start putting in the fabric. Older switches will need to be replaced with ones that support an Ethernet fabric and those will need to be configured, but the process is far simpler than migrations using earlier network technology. Once they are in place, the network will be ready to support both virtualization and cloud computing so the company can get the maximum benefits from both technologies.