The Evolution of Data CenterNetworking: How Advances areEnabling the Digital Worldaa

The Expansion of Data and Bandwidth Needs

As enterprises have shifted more services andoperations to the cloud and data center usage has rapidly increased, the volume ofdata being processed and stored has exploded. According to recent estimates,the volume of data generated worldwide each year will grow to around175 zettabytes by 2025. With this exponential data growth has come a need fordata centers and their internal networks to support vastly higher bandwidthrequirements to efficiently move and access all this information.Traditional data center network architectures can no longer keep up withskyrocketing traffic demands.
This has driven networking advances focused onincreasing throughput, reducing latency, and enabling highly scalable, automatednetworks.

The Rise of Virtualization and HyperconvergedInfrastructure

One of the major developments enabling higher Data Center Networking densities, workloads, andbandwidth needs has been the rise of server and network virtualization.Virtualization technologies allow multiple virtual machines and workloads to runsimultaneously on the same physical servers. This increases server utilizationrates dramatically. At the same time, it introduces new virtual networkingrequirements within data centers. To support virtualized environments, datacenter networks needed new high-performance switching fabrics and automationcapabilities. Network virtualization solutions emerged that could providelogical networks on top of physical switching infrastructure. Thesedevelopments paved the way for hyperconverged infrastructure, where compute, storage, networking, and virtualization are integrated and automated within single nodes or clusters. Hyperconverged infrastructure radically simplified data center design while boosting available networking bandwidth through its built-in virtual fabric.

The Adoption of High-Speed Optics and Switching Fabrics

To deliver the bandwidth virtualized infrastructure demands, data center networking needed to adopt higher port speeds and switching throughputs. This drove a transition from 1 Gigabit and 10 Gigabit Ethernet to 25 Gigabit, 40 Gigabit, 100 Gigabit, and now 400 Gigabit and above Ethernet speeds. Optics shifted from multimode fiber to lower cost, higher bandwidth single-modefiber capable of supporting 100G and beyond. Networking switches proliferated with high-radix designs and merchant silicon chips delivering terabit scale