Citrix and Intel Help Advance Next-Generation Data Centers with Citrix NetScaler®

Enterprises get the tools and technologies they need to evolve their data centers toward software-defined networking.

Today's business decisions rely on accurate, real-time data, but the sheer volume of data and its encryption requirements can severely impact the performance of company servers, applications, and networks.

Load balancers and application delivery controllers (ADCs) have become common fixtures in traditional networks to mitigate this impact. However, the ongoing need to optimize the network for application performance and security have caused many organizations to look beyond hardware. These forward-thinking companies deploy software-based solutions that can deliver equal performance without an overdependence on custom hardware. Indeed, software has become the primary means of network optimization and evolution.

ADCs act as a service or catalog of services that can be optimized to meet an application's demand. Even so, conventional networks can limit a data center's scalability and performance because networking services are bound to physical devices. Devices must be connected and configured manually and require ongoing maintenance and administration.

The software-first approach to networking entails a new paradigm of automation and means that network services no longer need to be limited to a physical appliance or console. The network functions that are offered by ADCs can be seamlessly provisioned by using a centralized network control center. Devices are connected once and then all remaining configuration and management is handled by a centralized management infrastructure.

As businesses invest to modernize their data centers, they need open solutions that support a high degree of interoperability with other vendor solutions. That's one reason the option to shift away from hardware dependency to a software-defined infrastructure (SDI)—an infrastructure supported and automated by key software instrumentation and scripting—is growing in appeal. With an SDI, IT administrators can automate and operate network tasks with increased efficiency.

Three Degrees of Flexibility

Citrix NetScaler® TriScale® technology enables companies to:

Mitigate endless appliance sprawl

- Consolidate multiple physical appliances to a multi-tenant appliance

Increase resiliency and capacity

- Support up to 32 nodes with any model of NetScaler

- Build high-availability (HA) clusters for seamless workload failover

Invest in a pay-as-you-grow model

- Buy the capacity you need today

- Expand with a software license to upgrade as data-center needs increase

A Software-First Strategy Supports Openness and High Performance

Software-defined networking is the first step toward fully virtualized network infrastructures. This approach enables enterprises to not only cut down on operation and hardware costs, but also to increase the agility and scalability of the applications that reside in their on-premises and cloud-based data centers.

Citrix began working on a software-first networking strategy almost two decades ago with its ADC offering, Citrix NetScaler®. NetScaler consolidates network services, analytics, management, and orchestration in a single platform, which can improve the performance of critical business applications.

NetScaler can be deployed as a:

- Bare-metal appliance (Citrix NetScaler MPX™)

- Physical appliance with virtual instances (Citrix NetScaler SDX™)

- Virtual appliance (Citrix NetScaler VPX™)

- Service in a Docker* container (Citrix NetScaler CPX™)

NetScaler CPX is a virtualized, micro-form version of NetScaler that serves the needs of application developers for deployments in containers.

The architecture and integrated technology of the Intel® Xeon® processor E5 family supports the Citrix software-first strategy with improved encryption, performance, and data availability. NetScaler is designed to maximize the performance of these multi-core processors to help increase operational efficiency in your data center. By playing off of one another's strengths, the Intel Xeon processor E5 family and NetScaler are able to move more data more quickly through your data center.
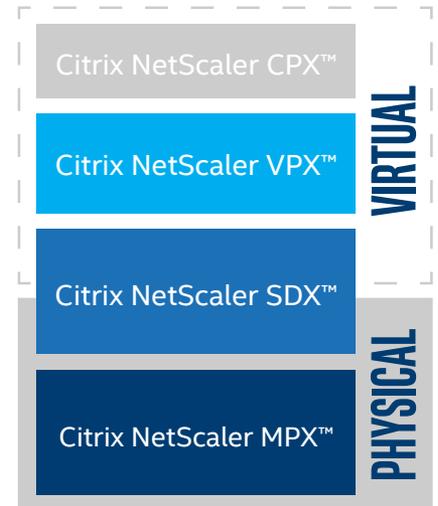

Figure 1. Citrix NetScaler® offers a variety of deployment options to meet your unique data-center needs

Citrix NetScaler: One to Any

Regardless of form factor, the NetScaler code base and feature sets are identical and support a single API (NITRO), so NetScaler works with any hypervisor, cloud, orchestration platform, or fabric architecture. This common ground and software-centric architecture enables a natural progression from physical to virtual to container.

No matter what version of NetScaler you implement, Citrix NetScaler® TriScale® technology provides unmatched scalability to meet the high-traffic demands of next-generation data centers (see sidebar).

NetScaler is optimized to squeeze the maximum capacity and support from Intel® architecture and up to 55 MB of L3 cache on the Intel® Xeon® processor E5 v4 family. This lowers latency and accelerates performance—because it's much faster for data to move through the L3 cache than through main system memory.

NetScaler supports up to 256 million concurrent connections without degrading application performance. In fact, on average, NetScaler can

accelerate application performance up to five times compared to networks that don't use ADCs.[1]

Simple, Insightful, and More Secure

NetScaler provides high-capacity traffic management and connection multiplexing to improve application performance and availability. Administrators can configure and program the device by using a graphical user interface (GUI), a command-line interface (CLI), or an API.

Hybrid security is essential to protecting applications against the ever-increasing ingenuity of cybercriminals. Signature based threat detection isn't enough, and necessary measures must be taken to detect potential threats based on anomalous user traffic. NetScaler can secure access to your applications and data, and can protect web servers from malicious threats and attacks:

- **Nine levels of built-in encryption** at the network, connection, and application levels help defend applications against web-based attacks, such as denial of service (DoS) and SQL-injection attacks.

- **Generated collections of telemetry and metrics** provide visibility into the transactional data streaming through the network and automatically record and correlate server-side and client-

side performance. This provides IT administrators with real-time insight into users, workflows, and transactions that pass through a NetScaler appliance.

Intel® Xeon® Processors Enhance Citrix NetScaler Capabilities

Citrix NetScaler and the Intel Xeon processor E5 family include features that help keep the transmission of data stable, secure, and swift. NetScaler is designed to put data as close to the processor as possible and perform multiple operations while the data is in caches. This enables NetScaler to decrease the latency of the data moving through the ADC.

The Intel Xeon processor E5 family comes in a variety of configurations, so core counts, frequencies, and power levels can be tailored to fit the workload. The Intel Xeon processor E5 v2 family supports up to four DDR3 DIMM channels and 12 cores. The Intel Xeon processor E5 v4 family supports up to four DDR4 DIMM channels and 22 cores. The Intel Xeon processor E5 family has Intel® Hyper-Threading Technology (Intel® HT Technology) built into the chip, so each core can manage two threads simultaneously—that's up to 24 threads on the Intel Xeon processor E5 v2 family and up to 44 threads on the Intel Xeon processor E5 v4 family.[2] NetScaler is able to process different packets within each core,

so no matter which Intel Xeon processor E5 family is in your infrastructure, your data center benefits from better performance and scalability.

NetScaler also capitalizes on the technology integrated in the Intel Xeon processor E5 families to enrich data security and the management of critical workloads, such as database transactions and vector operations:

- **Intel® Advanced Vector Extensions (Intel® AVX)** accelerates floating-point operations for increased support of mixed workloads.

- **Intel® Data Direct I/O Technology (Intel® DDIO)** bypasses main memory and sends input/output (I/O) packets straight to the processor cache to improve throughput and lower latency.

- **Intel® Advanced Encryption Standard New Instructions (Intel® AES-NI)** speed up encryption and helps secure session-initiation protocols, which allows for more prolific encryption without slowing down apps.
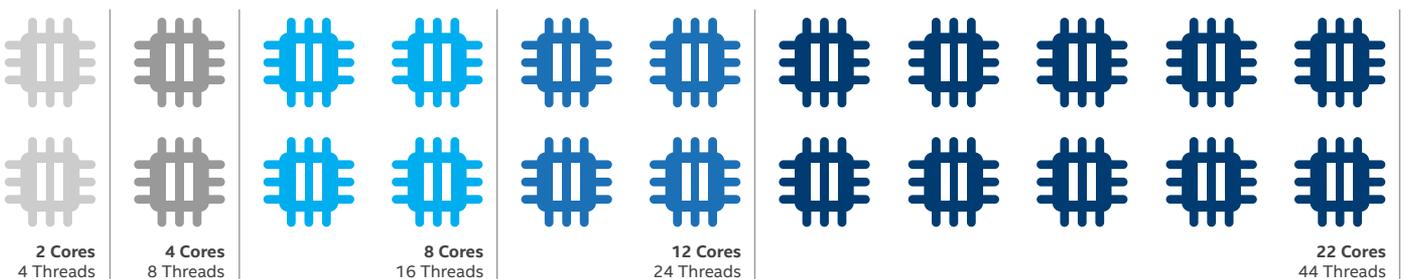

2 Cores	4 Cores	8 Cores	12 Cores	22 Cores
4 Threads	8 Threads	16 Threads	24 Threads	44 Threads

Figure 2. Intel® HT Technology doubles the amount of packets that Citrix NetScaler® is able to process with the Intel® Xeon® processor E5 family

- **Intel® Platform Protection Technology and Intel® Trusted Execution Technology (Intel® TXT)** provide hardware-based security that increases defense against malware and distributed-denial-of-service (DDoS) attacks at the BIOS and operating-system levels.

- **Intel® Virtualization Technology for Directed I/O (Intel® VT-d)** improves performance of I/O devices in virtualized environments and enhances the system's overall security and reliability.

Together, NetScaler and the Intel Xeon processor E5 families enable your company to accommodate even the largest high-traffic environments—such as Carrier Grade Network Address Translation (CGNAT), storage solutions, cloud-services, and telecommunications.

Intel and Citrix: Software-Defined Networking (SDN) Symbiosis

Keeping a network at peak performance doesn't have to mean deploying new hardware every time the data center capacity increases. Citrix and Intel are committed to providing enterprises with solutions that exceed expectations while lowering total cost of ownership (TCO), so it should come as no surprise to learn that they're already planning for a future when network traffic is 100-percent encrypted.