



Agile application-driven networks with Cisco ACI and NetScaler

Creating flexible networks for application delivery in the cloud

“As the leader in application delivery and application virtualization, Citrix NetScaler powers some of the world’s largest clouds. As the de facto choice for clouds, NetScaler has the application intelligence to deliver the network context to drive automated policy changes. Cisco demonstrated Cisco ACI with NetScaler making dynamic, on-the-fly reconfigurations of the network as changes in the Citrix virtual desktop infrastructure happened. By deploying ACI and NetScaler, our joint customers can benefit from a rich set of application delivery controller functions while preserving their existing L4-L7 operational models. Since NetScaler is the ADC of choice for both VDI and mobility, our customers can enjoy the advantages of Cisco ACI-powered infrastructure to bring faster application deployment and enable workload mobility.”

Soni Jiandani

SVP, Cisco ACI Division

When deploying strategic business applications, many companies pursue a cloud services delivery model to improve utilization, conserve budget and enhance flexibility. Enabling technologies such as server virtualization are helping to fuel the transition to cloud, but many data centers still lack the ability to provision networks on demand. Reconfiguring network components is labor- and time-intensive, and often prone to error. Deployment delays can mean lost productivity, lost business intelligence and lost revenue. Recognizing the need for agile networks, Citrix and Cisco created a solution that enables application-driven network provisioning.

Cisco® Application Centric Infrastructure (ACI) is a scalable, resilient and high-speed fabric that uses software-defined networking (SDN) concepts to automate network configuration. The physical fabric is created once; network services are then overlaid via centrally managed software-defined policies. ACI takes advantage of the full feature set of NetScaler App Delivery Controller (ADC) appliances, applying Layer 4 through Layer 7 network services to configure NetScaler to intelligently control traffic flows. ACI features a centralized point of control—the Application Policy Infrastructure Controller (APIC)—which administrators use to set up and manage the ACI infrastructure, including the insertion of NetScaler services. Using APIC, administrators configure network service policies in application-specific profiles. The combination of ACI and NetScaler technologies provides a flexible way to link network services to applications, thereby improving application security, increasing performance and optimizing service levels.

To demonstrate how NetScaler appliances help to enhance cloud application delivery, Cisco and Citrix developed a reference architecture for deploying enterprise applications on an ACI fabric with NetScaler. Engineers validated the architecture and documented the design, deployment steps and test results in this [design and implementation guide](#). The guide creates a Microsoft® SharePoint Server® 2013 deployment, and shows how easy it is to define and configure NetScaler policies that control traffic on the ACI fabric. While the guide focuses on a configuration for SharePoint, the deployment applies generally to other enterprise applications, including SAP, IBM WebSphere, Oracle E-Business Suite, Microsoft SQL Server, MySQL database services and more.

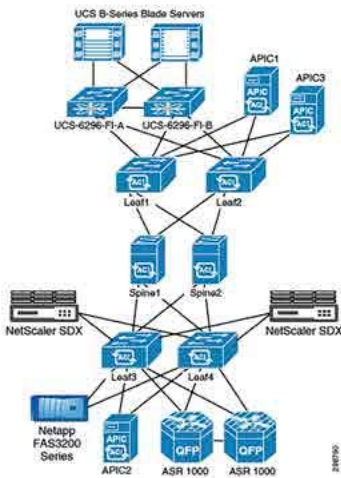


Figure 1. Physical topology of the ACI/NetScaler solution.

Deploying Cisco ACI and NetScaler for agile, policy-driven networks

The ACI fabric connects networks to applications without the need to rewire or physically reconfigure network components as application requirements change. Built on a foundation of Cisco ASR 1000 routers and Cisco Nexus 9000 spine and leaf switches (Figure 1), ACI consolidates virtual and physical networks, supporting any-to-any routing and switching for optimal flexibility in cloud datacenters.

APIC provides a centralized interface to perform L2-L7 network management—including service insertion for the full range of L4-L7 NetScaler capabilities—rapidly building out production-ready configurations. Network administrators can use the APIC GUI to design and control networks, or programmatically define configurations in APIC using XML or JSON.

Value of the joint solution

NetScaler intelligently directs application traffic between the Cisco ACI fabric and the available infrastructure. Cisco recommends the use of NetScaler appliances when designing next-generation data center networks (or as a direct replacement to Cisco ACE products) because NetScaler is the only ADC in which the full feature set is exposed to the ACI fabric. This comprehensive level of integration automates the process of aligning applications to infrastructure and reduces deployment complexity, increases agility and speeds time-to-production.

The table below summarizes NetScaler features leveraged in the reference architecture. Using APIC, network administrators define application profiles that intelligently chain NetScaler network services together (for example, combining content switching, SSL offloading and load balancing).

NetScaler Functionality	Application benefits
Traffic inspection and management	Identify destinations, ports and protocols for precise control; distinguish application and database requests from other traffic
Keep-alive, compression, caching, buffering	Reduce transaction times, lower bandwidth use and increase application responsiveness to optimize performance and scale
Load balancing	Improve response time and availability. Direct traffic to servers based on availability and policies (least load, round robin, hashing, etc.)
SSL offloading	Offload SSL processing from application servers for greater scalability; perform fast encryption/decryption in NetScaler hardware; improve application security and compliance
Content switching	Direct content requests to targeted server groups; perform switching based on device, client browser, ISO language, location, character set, etc.; especially useful for customizing delivery of mobile apps
Layer 7 application firewall	Perform firewall inspection at the application level (complementing ACI firewall); apply signature files to protect against denial of service (DoS), SQL injection and cross-site scripting (XSS) attacks
Global server load balancing (GSLB)	Distribute application traffic across multiple data centers to enable disaster recovery

“Both Cisco and Citrix believe that the data center is undergoing a fundamental transformation, driven by cloud, mobility and virtualization. Successfully managing application workloads in these modern data centers requires a flexible, scalable, application-aware network. To help customers make this transition, Cisco and Citrix are collaborating to unify best-in-class technologies based on Citrix NetScaler and Cisco Nexus to accelerate the transformation to new network service delivery models in the mobile-cloud era.”

Klaus Oestermann

SVP and GM, Citrix Delivery Networks

NetScaler is available in both physical and virtual appliances to best match requirements: NetScaler MPX (a hardened physical appliance that supports up to 50 Gbps), NetScaler SDX (a physical appliance that consolidates and isolates up to 40 virtual NetScaler instances) and NetScaler VPX (virtual appliances that run on popular hypervisors). NetScaler provides investment protection while scaling up, in or out:

- Scale up: Pay-As-You-Grow licensing grows NetScaler capacity by up to 10 times without costly hardware upgrades. NetScaler VPX Burst Packs are also available to adjust capacity for seasonal peaks.
- Scale in: NetScaler SDX appliances can consolidate up to 80 virtual instances on a single appliance, thereby conserving power to lower operating expenses.
- Scale out: Clusters of up to 32 NetScaler appliances can be easily managed together for a total throughput of 5Tbps+.

The Cisco and Citrix reference architecture for SharePoint uses NetScaler SDX appliances configured with virtual instances and is designed to support failover for high availability.

Optimizing scalability and performance

By conserving resources and boosting application performance, NetScaler contributes to infrastructure scalability and higher ROI. NetScaler appliances perform load balancing for both edge and content servers, distributing traffic across servers in the farm. Load balancing in a single data center or GSLB across multiple data centers optimizes response times for client requests and helps to prevent outages. Unlike other ADC devices, NetScaler appliances provide highly consistent performance when multiple services (such as content switching, SSL offloading and load balancing) are chained. NetScaler also functions as an SQL proxy by offloading connection management from SQL servers to improve database performance and scalability. In addition, fast data compression, content caching and SSL acceleration optimize network bandwidth and offload CPU-intensive tasks. As a result, application servers can scale more efficiently and process a greater load.

Securing application delivery

Since enterprise applications frequently access sensitive customer information and corporate data, application traffic must be protected against compromise. NetScaler SDX provides robust multi-tenancy, supporting completely independent NetScaler instances that can be configured with separate policies and IP addresses.

To help companies meet compliance requirements, NetScaler enables application-layer security protections, including a full-featured application firewall, data loss protection and countermeasures for thwarting DoS and other L7 attacks. The NetScaler application firewall examines bi-directional traffic, including SSL-encrypted packets, which helps guard against a range of security threats. NetScaler applies SSL offloading pervasively beyond HTTPS. A simple SSL offloading scheme decrypts SSL records in HTTPS and then forwards HTTP traffic

in clear text to backend web servers. To protect against HTTP compromise, NetScaler uses an end-to-end SSL offloading approach that re-encrypts clear text to the web servers. To accelerate SSL encryption and decryption operations, NetScaler MPX and SDX models implement 2048 and 4096 bit RSA keys in hardware.

Enabling resiliency and failover

A resilient architecture for business applications includes redundant infrastructure components and failover features. The ACI and NetScaler reference architecture for SharePoint implements a Virtual PortChannel (vPC) topology that allows ACI traffic to continue even if one or more switch failures occur. Two NetScaler SDX appliances with two 10G links each form a pair of LACP port channels for highly available redundancy. The NetScaler SDX units are deployed in a physical 1-arm mode but in a logical 2-arm mode, carrying traffic for multiple VLANs through a single port channel. Virtual NetScaler instances on each SDX appliance are configured in active/standby pairs. When APIC updates service configurations, changes are synchronized automatically from the active NetScaler instance to the standby. A health check monitors the active node and if a failure occurs, the standby instance takes over as active.

NetScaler load balancing promotes high service levels for on-demand applications. Within a single data center, if an infrastructure server is unavailable, the NetScaler instance directs application requests to the remaining servers. NetScaler DataStream technology performs intelligent monitoring of Microsoft SQL Servers, detecting which AlwaysOn node is the master so that the NetScaler load balancing service directs traffic appropriately. When NetScaler is configured for GSLB, it distributes client requests across data centers based on criteria such as load, geographic proximity or the nature of the transaction. If a data center link goes down, client requests are simply redirected to another data center, providing the highest level of resiliency for disaster recovery.

Conclusion

The combined ACI and NetScaler solution enables the type of infrastructure agility needed to deploy flexible application services from the cloud. The solution can help IT organizations be more responsive to line-of-business requirements, speeding time-to-deployment while optimizing application performance, scale, security and availability. Together, ACI and NetScaler technologies build an elastic and scalable deployment architecture that provides lifecycle control of network services, including NetScaler L4- L7 functions. Providing a single and centralized management interface through APIC along with programmatic controls, the solution automates the configuration of network services to match business and application requirements.

Learn more

To learn more about deploying NetScaler in a Cisco ACI fabric, download [“Deploying Microsoft SharePoint with Cisco ACI and NetScaler, Design and Implementation Guide.”](#) The document discusses the solution architecture and explains how to use APIC to configure NetScaler load balancing, SSL offloading and content switching on the ACI fabric. It shows how to use the APIC GUI to define profiles for HTTP, HTTPS, SQL database and SharePoint client requests, and provides all of the XML files that can be processed by a Python interpreter

to provide equivalent functionality. The guide also describes test cases used to validate the NetScaler and ACI architecture, including test scenarios that demonstrated successful traffic management, application firewall protection and GSLB failover.

To gain more information about developing agile and resilient cloud infrastructures using NetScaler and ACI, contact your Citrix and Cisco account teams. Get started building an elastic and responsive data center that can rapidly deliver critical business applications as cloud services.

Resource	URL
NetScaler site	http://www.citrix.com/netscaler
Cisco ACI site	http://www.cisco.com/go/aci
"Deploying Microsoft SharePoint with Cisco ACI and NetScaler, Design and Implementation Guide"	http://www.cisco.com/c/en/us/td/docs/solutions/Enterprise/Data_Center/VMD/SharePoint_ACI_Netscaler/1-0/Citrix.html
"Implementing Cisco Application Centric Infrastructure with NetScaler Application Delivery Controllers" (PDF)	http://www.citrix.com/content/dam/citrix/en_us/documents/products-solutions/implementing-cisco-application-centric-infrastructure-with-citrix-netscaler-application-delivery-controllers.pdf

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