

# Cisco Unified Computing System: Built for Virtualization and Consolidation

Solution Brief  
November 2013



## Highlights

### Infrastructure That Delivers on the Promise of Virtualization

- Cisco Unified Computing System™ (Cisco UCS®) with intelligent Intel® Xeon® processors, delivers a reliable, agile, scalable, and elastic infrastructure to support more virtualization with reduced total cost of ownership (TCO).

### Rapid Deployment

- Self-aware, self-integrating infrastructure automatically discovers and configures servers, creating an elastic infrastructure.

### Simplified Architecture

- A simplified architecture reduces costs and increases flexibility.

### Greater Performance

- A better infrastructure delivers better performance, as Cisco UCS has proved with 14 world records on virtualization benchmarks.

### Increased Security

- Virtual machines connect directly to the network just like physical servers, securing the virtual machines as if physical wires were used.

### High Availability

- The network fabric is designed with no single point of failure.

### Increased Flexibility

- Cisco UCS supports all the leading hypervisors and their best practices with a single Cisco virtual interface card (VIC).

“Do more with less. Increase utilization levels. Improve staff efficiency. Reduce your space, power, and cooling needs.” Every vendor makes the same promises. Cisco delivers.



Although virtualization technology has made server consolidation possible, it has also created many challenges. Infrastructure is complex, difficult, and time consuming to scale. Network ownership is split between network and server administrators. Security is managed by least-common-denominator approaches. And the massive number of virtual machines these environments spawn taxes server, network, and storage administrator time.

## A Platform for the Post-Virtualization Era

Powered by Intel® Xeon® processors, the Cisco Unified Computing System™ (Cisco UCS®) is a platform that delivers on the promise of virtualization, proving the degree to which infrastructure matters in virtualized environments. Cisco UCS provides rapid deployment through automated configuration. It reduces costs by simplifying architecture. It delivers greater performance from Intel Xeon processors through a better balance of resources and through performance optimizations available only from Cisco. Virtualization is built into the network, allowing administrators to manage virtual machines exactly the same way as physical servers, providing massive scalability along with uncompromised security, visibility, and control. Best of all, Cisco UCS tightly integrates the major hypervisors with the system's own integrated, unified management. The result is greater choice and more effective virtualization, increased consolidation ratios, and lower total cost of ownership (TCO).

## Single Unified System

Cisco UCS is the first truly unified data center platform that combines computing, networking, and storage access into a single cohesive system. The system is intelligent infrastructure that uses integrated, model-based management to simplify and accelerate deployment of virtualized environments. The system's unified I/O infrastructure uses a 10-Gbps unified fabric to support IP, storage, and management traffic, and Cisco® Fabric Extender Technology (FEX Technology) brings the network directly to the server and virtual machines for increased performance, security, and manageability.

Cisco UCS is platform neutral, supporting a comprehensive product line of both rack and blade servers, enabling IT departments to deploy the servers that best meet their specific business requirements (Figure 1).

## Rapid Deployment

Virtualized environments need to be highly responsive to fluctuations in workload demands, and Cisco UCS provides a hardware version of the capabilities that virtualization provides in software: an elastic environment that can scale up and down to meet business requirements and fluctuations in workload demands.

Cisco's approach provides IT departments with an excellent infrastructure for virtualized environments while providing the

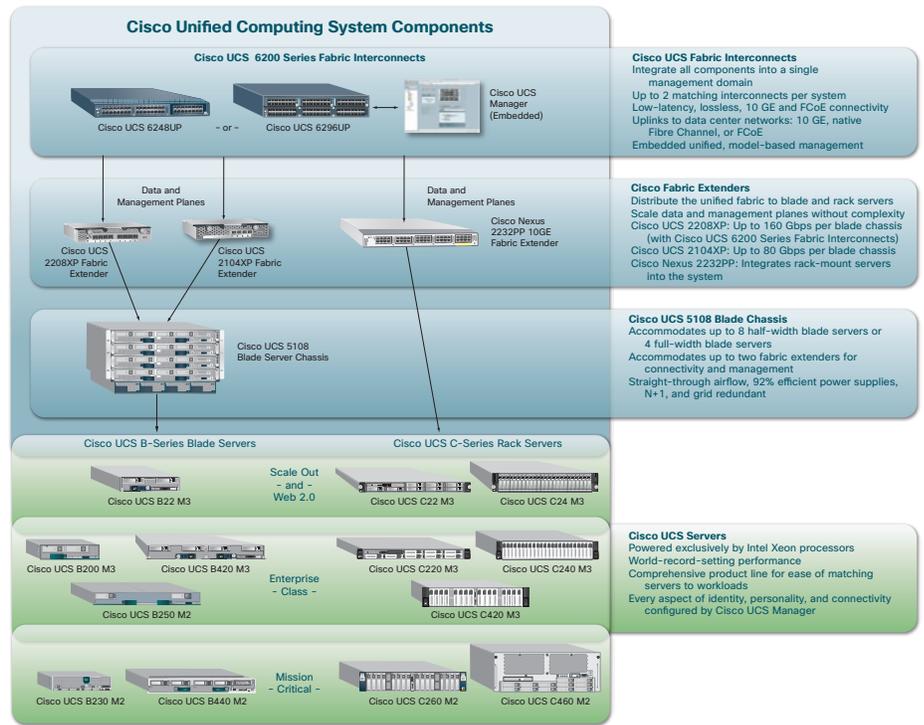


Figure 1. Cisco Unified Computing System Is a Unified Data Center Platform

foundation for them to move forward to cloud computing.

In traditional environments, scaling is accomplished through a tedious, manual, error-prone process of configuring servers and network devices that can take days or weeks to accomplish. In contrast, Cisco UCS is self-aware, self-integrating infrastructure that can recognize and configure servers as they are connected to the system, without the need to reconfigure networking components to accommodate them.

IT departments that use Cisco UCS to support their virtualized environments can scale in minutes, helping meet business objectives and service-level agreements (SLA) with ease. Automated configuration helps ensure consistency and reliability, eliminating configuration drift, which can result in downtime.

Cisco UCS Central Software extends the automated configuration capabilities of Cisco UCS by managing up to 10,000 servers in Cisco UCS domains in a single data center or distributed around the world. With global inventory

### Rapidly Provision Virtual Machines

Euronet Worldwide, an industry leader and provider of highly secure electronic financial transaction solutions, deployed Cisco UCS and reduced the time needed for virtual server implementation and provisioning by up to 95 percent compared to the time needed for its former infrastructure. The new implementation has resulted in decreased power consumption, cooling needs, and rack space.

(See Marketwire [press release](#))

and coordinated configuration, IT departments have the tools they need to manage virtualized environments regardless of scale.

Cisco UCS is hypervisor neutral, supporting virtualization software designed for industry-standard x86-architecture servers such as those powered by Intel Xeon processors. Cisco UCS supports even greater efficiency through close integration with Microsoft Windows 2012 Hyper-V, Red Hat Enterprise Virtualization, and VMware vSphere.

### Simplified Architecture

Traditional virtualized environments are excessively complex, with multiple physical networks for different hypervisor functions and I/O modalities. Complexity is magnified through the existence of multiple physical network layers, making visibility into virtual networks difficult to achieve. Cisco UCS

reduces these capital and operating costs while increasing agility by using an architecture with fewer components and only a single point of management.

### Unified Fabric

The system's low-latency, high-bandwidth unified fabric condenses multiple networks into one, reducing cabling and switching infrastructure and the costs they incur. The 10-Gbps unified fabric carries system management traffic, production IP networking, storage traffic, and the multiple additional networks that virtualized environments require (such as separate networks for virtual machine migration). With a single set of cables, IT departments can achieve security and management as if each network were discrete, while reaping the benefits of resource sharing. Furthermore, the use of Fibre Channel over Ethernet (FCoE) brings SAN storage to every server in the system with no additional cost.

### Cisco Fabric Extender Technology

Cisco FEX Technology further reduces costs and complexity by condensing multiple network layers into one, eliminating the need for software switches within hypervisors and for hardware switches at the top of every rack or within every blade server chassis. As a result, with Cisco UCS the organization has fewer components to purchase, configure, power, cool, and maintain. The simplified architecture delivers better performance because server CPUs are free to deliver application performance rather than

spending cycles emulating switches in software.

### Higher Performance and Increased Consolidation Ratios

Cisco UCS begins with industry-standard, x86-architecture servers with intelligent Intel Xeon processors: the Intel Xeon processor E5-2600 v2 family at the core of a flexible, efficient data center, and the Intel Xeon processor E7 family that provides the power and reliability needed for business-critical solutions.

Although many vendors offer servers with the same processors, Cisco integrates them into a system with a better balance of resources. This balance brings processor power to life with at least 70 world-record-setting benchmark results that demonstrate higher virtualization performance and increased consolidation ratios.

### World-Record Virtualization Performance

Cisco has demonstrated long-term leadership by establishing 15 world records on VMware® VMmark™ benchmarks that evaluate not just virtualization performance, but also the effectiveness of the underlying infrastructure in performing common tasks such as virtual machine migration. Cisco's performance is propelled in part by Cisco virtual interface cards (VICs), which can connect up to 160 Gbps of bandwidth per server. Cisco's outstanding scalability is due in part to the system's high-bandwidth unified fabric.

### More Processing Power for Applications

Cisco VICs directly connect virtual machines to fabric interconnect ports for up to 38 percent greater I/O throughput, freeing CPU cycles to deliver application performance instead of emulating switches in software. The performance benefit of Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) technology is experienced in applications as well, with improvements in Microsoft SQL Server performance and a greater number of users supported by virtualized SAP environments.

### Industry-Leading Density

Cisco is the first vendor to recognize the need for more memory in 2-socket servers to support more virtual machines on a single server while increasing CPU utilization. Ever since the introduction of patented Cisco Extended Memory Technology, Cisco has led the industry in providing high-density and low-cost memory options for customers. The benefit of Cisco's memory capacity is seen in the density that can be achieved on virtual desktop infrastructure workloads running on Cisco UCS, with more than 185 desktops running the knowledge worker profile on a single 2-socket server.

### High-Performance Networking

World-record performance for virtualized environments is propelled by Cisco's 10-Gbps unified fabric, which can accommodate all the networking

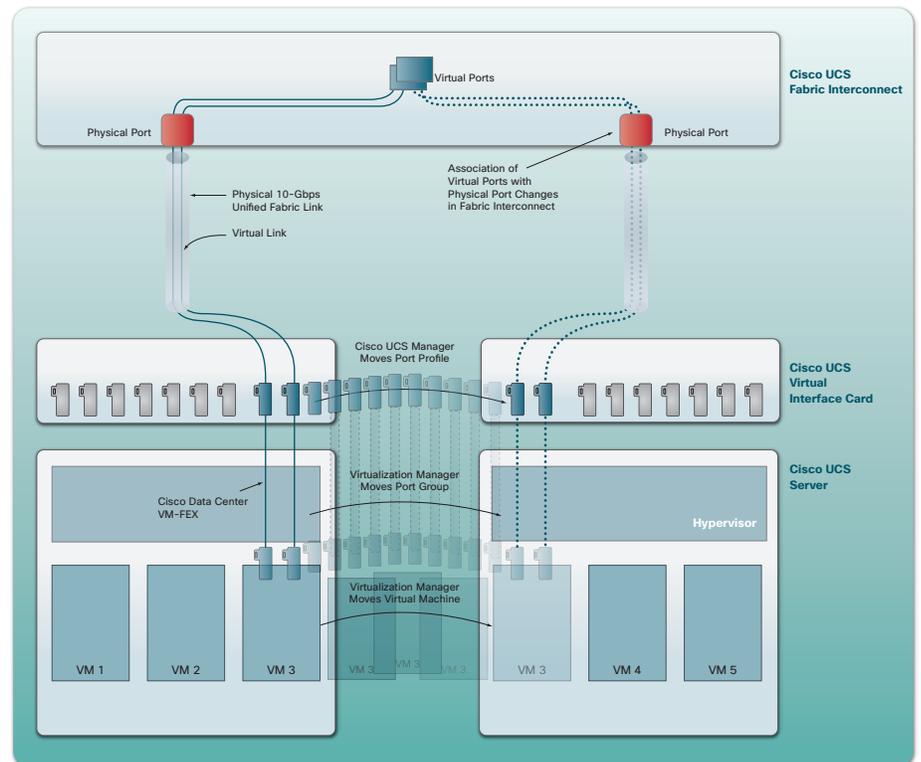
needs of a server and virtual machine, with up to 160 Gbps of bandwidth per server. Cisco's low-latency, high-bandwidth unified fabric is one reason why Cisco UCS is so effective in performing infrastructure tasks such as virtual machine migration.

Cisco unified fabric in combination with Cisco Fabric Extender Technology establishes a flat network topology within a single system, resulting in deterministic latency for all virtual machine network traffic regardless

of location. This feature gives IT departments freedom to move virtual machines between servers to achieve optimal resource utilization without having to worry about whether the move will change network performance.

### Air-Gap Security

Traditional virtualized environments struggle to balance flexibility and security, often relinquishing some security so that administrators can move virtual machines anywhere within



**Figure 2.** Cisco Data Center VM-FEX Attaches Network Interface Cards (NICs) and Their Network Policies to Individual Virtual Machines, Maintaining the Connection as Virtual Machines Move Between Physical Servers

a virtualization cluster for workload optimization.

Cisco UCS eliminates the need to make trade-offs because there is no difference between physical and virtual networks: both are implemented in hardware and have the same level of visibility, control, and security. With Cisco FEX Technology and Cisco Data Center VM-FEX, individual hypervisor functions and virtual machines can be directly connected to the fabric interconnects as if they were connected by a dedicated wire. Increasing security even more, the direct connections are maintained for the life of a virtual machine, so network security policies remain constant regardless of the virtual machine's location (Figure 2).

In the event that a hypervisor is compromised, only Cisco UCS offers the capability to completely and automatically reimage a system from the firmware up, helping ensure that every aspect of a system can be recovered to a known state.

### Higher Availability

From the system's fabric interconnects to individual servers, the system is designed to have no single point of failure. Dual unified fabric connections reach every server with maximum network bandwidth as a result of the active-active network design. In the event of a network failure, built-in fabric failover in Cisco VICs adjusts traffic flows to provide continuous availability (Figure 3).

Automated configuration in Cisco UCS supports virtualized environments by making it possible to completely reproduce an existing environment in a new location in the event of a failure that affects the entire data center location. Cisco UCS service profiles can be applied to configure server identity, personality, and connectivity to servers to replicate the original location's setup. In the second release of Cisco UCS Central Software, this process can be automated through global Cisco UCS service profiles, which can be applied to any server anywhere through a single GUI.

Cisco UCS provides higher availability at lower cost. Rather than having to maintain a backup server and hypervisor software licenses, organizations can configure a spare server in minutes to recover from a failure simply by applying a Cisco UCS service profile and booting the failed server's workload onto it. Fewer spare servers are required as well, because a single spare can be shared across multiple applications or virtualization clusters.

### Increased Flexibility

Cisco UCS supports all major hypervisors, giving customers the capability to choose their preferred virtualization software product and have the system adapt to its requirements.

Furthermore, Cisco VICs can be configured to support the static I/O requirements of any hypervisor, and

they be configured in moments to support a different hypervisor through a zero-touch configuration model. For example, customers running VMware vSphere software can configure the Cisco VIC to support VMware vSphere best practices, including separate interfaces for VMware vmkernel, vmconsole, vMotion, and storage access. Cisco Data Center VM-FEX directly connects virtual machines to the network with dedicated, dynamically configured virtual NICs (vNICs). If a software switch such as the Cisco Nexus® 1000V Switch is preferred, additional vNICs can be configured to support production IP networking traffic.

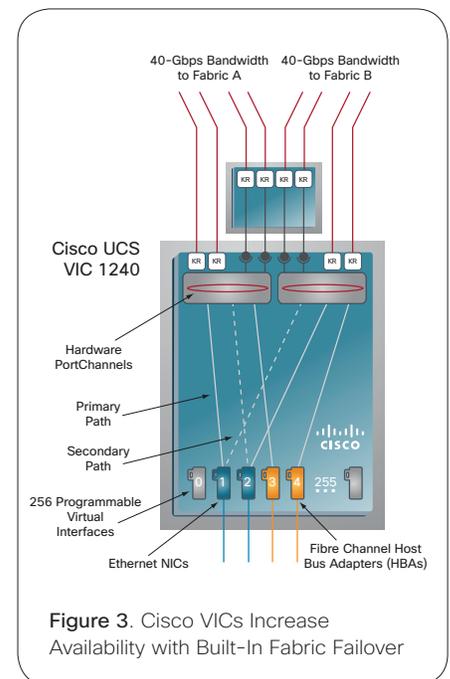


Figure 3. Cisco VICs Increase Availability with Built-In Fabric Failover

### Massive Consolidation

NetApp used Cisco UCS to virtualize its testing lab, and it consolidated 51 traditional blade server chassis with 178 servers to Cisco UCS with 15 blade server chassis and 120 servers. "It took just an hour to deploy the first 112-server Cisco UCS with NetApp storage and VMware vSphere," says Brandon Agee, technical lead in Engineering Support Systems.

[\(Read the case study\)](#)

### Offerings to Help Accelerate Deployment

Cisco has the product bundles, service offerings, and alliances needed to help customers implement their consolidation and virtualization projects fast, and with the customer's choice of storage options.

- Cisco has developed [ready-to-deploy solutions](#) using virtualization software from Microsoft, Red Hat, and VMware. These solutions are supported by Cisco Validated Designs which reflect tested and validated solutions, helping accelerate deployment and reduce risk.
  - The [Cisco Smart Play](#) program simplifies ordering by making the computing and networking components of a virtualization
- Cisco has engaged with EMC's [VSPEx program](#) to validate storage configurations and help ensure interoperability.
  - Cisco UCS servers are available to support virtualized environments immediately out of the box with preconfigured storage solutions:
    - Cisco UCS, EMC storage, and VMware vSphere software can be deployed using [Vblock™ Systems](#) from the Virtual Computing Environment (VCE) coalition.
    - Through Cisco's affiliation with NetApp, [FlexPod solutions](#) using Microsoft Windows 2012 Hyper-V and VMware vSphere can be deployed using NetApp storage.
  - The [Cisco Data Center Optimization Service](#) helps customers build a data center architecture that quickly and securely adapts to virtual and cloud environments, supports business growth and delivers operational excellence.

solution available through a single part number and at a favorable price. Cisco has a growing number of economically priced Smart Play offerings to support organizations implementing virtualized environments.



### Delivering on the Promise of Virtualization

While traditional vendors continue to struggle with patchwork solutions to the challenges that consolidation and virtualization pose, Cisco delivers on the promise of virtualization. Cisco UCS with intelligent Intel Xeon processors is a platform built to support virtualized environments, with a simplified and secure architecture that reduces costs, accelerates deployment, increases flexibility, enables massive scalability, and makes virtual environments as straightforward to manage as physical ones, further contributing to lower TCO.

### For More Information

For more information about Cisco UCS, please visit <http://www.cisco.com/go/ucs>.

For more information about Cisco virtualization solutions, please visit <http://www.cisco.com/en/US/netsol/ns1197/index.html>.

For more information about Cisco UCS virtualization performance, please visit <http://www.cisco.com/go/ucsatwork>.

For more information about application performance using Cisco Data Center VM-FEX, please visit <http://www.cisco.com/go/vmfex>.



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