

The Cisco HyperFlex Dynamic Data Fabric Advantage

Solution Brief
May 2017

The Benefits of Co-Engineering the Data Platform with the Network



Highlights

Cisco HyperFlex Dynamic Data Fabric

- Simplicity with less cabling and no decisions to make
- The quality you expect from Cisco: scalable, flat network with predictable latency and a single hop to any destination
- Automation that implements and optimizes the cluster's networking without opportunities for error
- No human touch required to adapt the cluster to changes in software or node configuration

In other products networking is an after-thought. In Cisco HyperFlex™ Systems, we engineered the network into the solution.

It shouldn't be surprising that only Cisco talks about the importance of networking. In first-generation products, networking was an afterthought. We view it as an integral and essential part of hyperconverged solutions. You need integrated networking to support:

- High storage bandwidth and I/O operations per second (IOPS)
- Massive amounts of east-west communication between virtual machines
- North-south bandwidth that connects smoothly with the rest of your data center
- Easy scaling as your cluster grows
- Simple day-0 deployment and continuing day-1 operations

A Better Way to Network

We use Cisco® SingleConnect technology as the exceptionally easy, intelligent, and efficient way to connect and manage computing in your hyperconverged systems. SingleConnect technology is an exclusive Cisco innovation that dramatically simplifies the way that the cluster connects with: rack and blade servers; hypervisors and virtual machines; and LAN, SAN, and management networks.

We use a pair of Cisco UCS fabric interconnects to establish an active-active 10- or 40-Gbps unified fabric. This connects everything over a single set of cables to separate devices configured on a single Cisco virtual interface card in each server (Figure 1). Both connectivity and management are integrated into the same device. You connect your Cisco HyperFlex nodes (and any compute-only nodes) with cables to support the bandwidth you need. Connectivity and quality-of-service (QoS) management is performed in software. You get a flat network with only a single hop between any two nodes. Predictable low latency means that the network

isn't a consideration as you decide how to place your workloads. And sharing bandwidth between network modalities (such as storage access and vMotion) gives you more flexibility, performance, and ease in sizing your network to meet the needs of your workloads.

Simplified and Automated

Our network is simple. When you install your cluster, you just connect your nodes to the fabric interconnects, and the installation wizard creates logical networks to connect the hypervisor and virtual machines through VMware virtual switches (vSwitches).

When day-0 installation processes give way to day-1 operations, you don't have to change anything about

your network infrastructure as you scale. Just connect a new node and the fabric interconnects discover it. Integrate the new node into the cluster with a few clicks in the management interface.

Automation with Cisco UCS Service Profiles

First-generation products left networking as a do-it-yourself project. We automate the network so you don't have to worry about any of the details of optimizing for best performance.

We achieve this automation through Cisco UCS service profiles. Every aspect of server identity, configuration, and connectivity is dictated by a service profile. So when you install a node with

preinstalled software, the service profile automates both the server and the network configuration to integrate it into the cluster and optimize its connectivity.

Service profiles automate node and network configuration so that deployment is fast, repeatable, and consistent. There's no risk of configuration drift or suboptimal configuration because everything is controlled through software, not through a tedious, error-prone manual process.

Ultimate Flexibility with Cisco Virtual Interface Cards

Automation is possible because Cisco UCS was designed as programmable infrastructure from the very beginning.

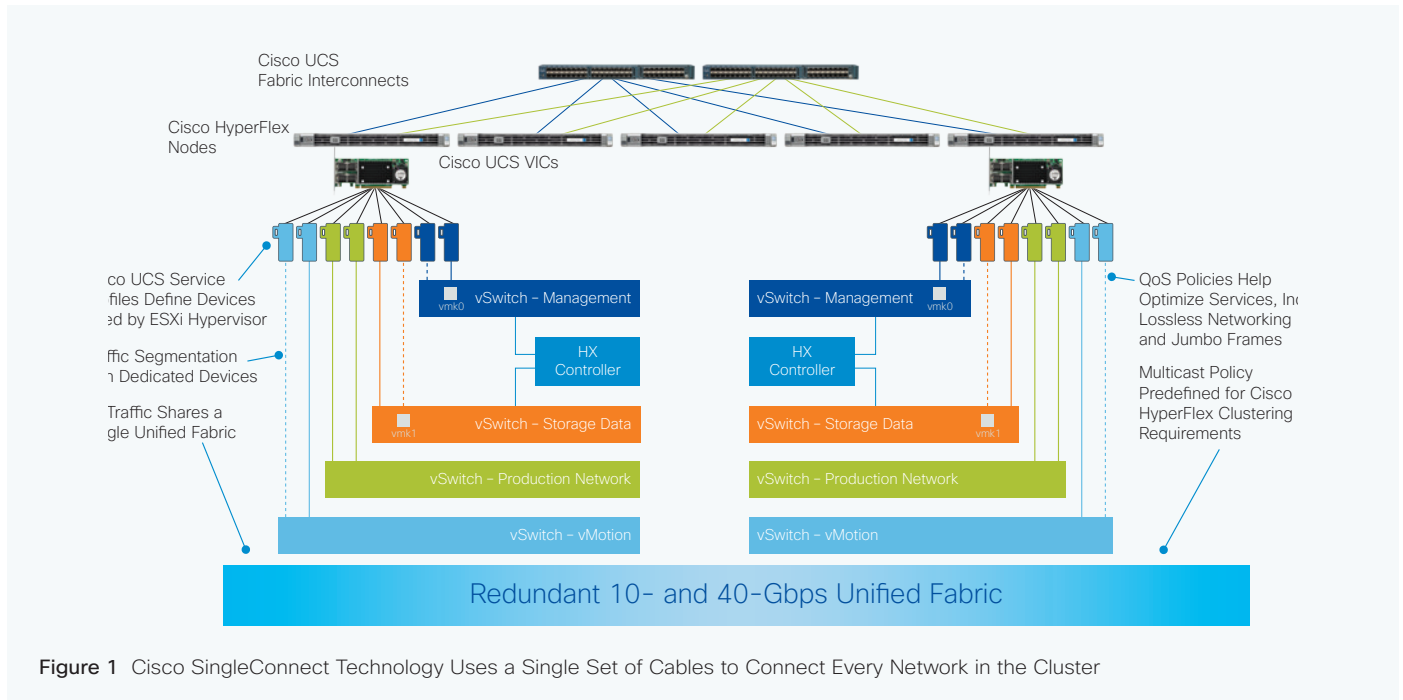


Figure 1 Cisco SingleConnect Technology Uses a Single Set of Cables to Connect Every Network in the Cluster

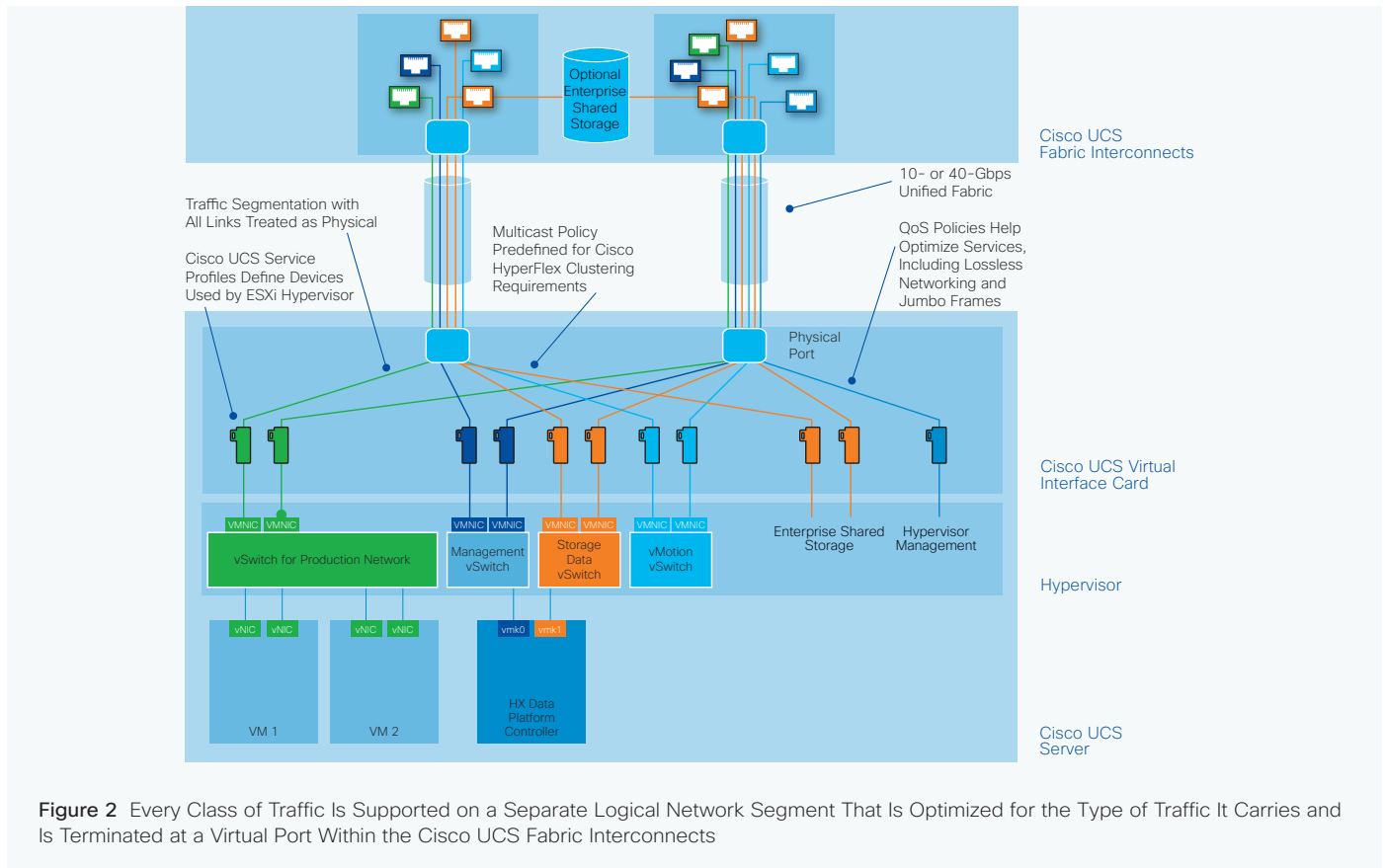


Figure 2 Every Class of Traffic Is Supported on a Separate Logical Network Segment That Is Optimized for the Type of Traffic It Carries and Is Terminated at a Virtual Port Within the Cisco UCS Fabric Interconnects

More than 100 aspects of server and network configuration are embodied in a Cisco UCS service profile, including the number and type of I/O devices in the node itself.

On-demand creation of I/O devices allows the cluster to automatically create and configure separate I/O devices and separate, securely isolated logical networks to:

- Connect to the hypervisor management interface
- Support virtual machine movement

- Connect to optional external Fibre Channel storage
- Support production IP networking for virtual machines
- Replicate storage blocks across the cluster through the Cisco HyperFlex HX Data Platform

Cisco UCS virtual interface cards (VICs) support and segment this traffic with a large number of dynamically configured network interface cards (NICs) and host bus adapters (HBAs) that connect

to both of the cluster’s two fabrics (Figure 2).

Although the cluster is configured with a single set of cables, each device dynamically created on a VIC acts as if it were the endpoint of a separate physical connection. This feature combines the visibility and control of physical networking with the scale and simplicity of virtual networks.

The Cisco UCS VIC 1387 can connect to each of two 40-Gbps fabric interconnects with a single pair of cables,

for 80 Gbps of connectivity per node. Alternatively, the Cisco UCS VIC 1227 can connect to each of two 10-Gbps fabric interconnects for 20 Gbps of connectivity per node.

Automated, Software-Defined Network Optimization

With complete software control over the I/O and network configuration, the cluster optimizes the network in the following ways:

- **Quality of service** is set up to dictate how network bandwidth is shared, including prioritizing storage traffic for low-latency read and write operations.
- **Security** is established with network segmentation. Cisco SingleConnect technology isolates each network segment as if it were a separate physical network.
- **Virtual-to-physical translation** is accomplished at the fabric interconnects so that different virtual networks can connect with VLANs or separate ports in your data center network.
- **Fabric redundancy** is set up to use both networks in normal operations. If a failure occurs, traffic can fail over to the remaining active network.
- **NIC teaming** is set up for failover to be performed by the vSwitches.
- **Multicast policy** is predefined to best support the Cisco HyperFlex HX Data Platform controller.
- **Lossless networking and jumbo frames** further optimize the network to deliver consistent latency and a high IOPS rate.

Flexible and Adaptable

Cisco HyperFlex systems integrate with your existing data center. The system's fabric interconnects are implemented using open standards, so connectivity to your enterprise data center network is straightforward. All the virtual network segments that you create to optimize the cluster's networks are visible as if they were physical.

You thus have the same visibility and control over your Cisco HyperFlex system as you do over any other physical servers connected into your data center network. Our philosophy is to make virtual networks visible and manageable using the same tools that you use to manage your enterprise data center. When you choose Cisco HyperFlex systems, you don't create a new island in your data center.

Adapt to Change

The cluster adapts to changes, such as the addition of a new node to a cluster, by automatically discovering the new hardware and allowing you to add it to the cluster through your choice of interfaces:

- The VMware vSphere plug-in allows you to manage your cluster's physical and virtual resources from a single point.
- The Cisco HyperFlex Connect management interface gives you complete control over your cluster and gives you access to its entire robust set of features.
- Cisco UCS Director is a higher-level orchestration and automation

Cisco SingleConnect Technology Is:

- **Easy**, with a “wire once and walk away” solution that eliminates traditional, manual, time-consuming, error-prone processes
- **Intelligent**, because it uses a zero-touch model to allocate I/O connectivity across physical rack and blade servers and virtual machines
- **Efficient**, because LAN, storage, and management networks are shared over a single network, reducing the number of moving parts compared to traditional approaches

tool that can manage your entire application lifecycle, from hardware infrastructure to virtual machine provisioning, deployment, and decommissioning. A workflow-based tool, Cisco UCS Director can manage

your Cisco HyperFlex system and all your data center infrastructure, including third-party servers and switching.

- Cisco ONE™ Enterprise Cloud Suite can turn your Cisco HyperFlex cluster into a private cloud with on-demand, pay-as-you-go services provided to clients. With the capability to evaluate the relative cost of migrating or augmenting workloads in various public cloud services, it can provide you with an informed way to manage workloads in a hybrid cloud that can optimize your overall IT costs.

Ongoing Operations

The integrated networking in Cisco HyperFlex systems in combination with Cisco UCS VICs gives you flexibility to adapt to future needs with no human touch required.

If you need to change hypervisors or repurpose your server, you can do so

with Cisco UCS service profiles, which create new devices dynamically. You don't need to change interface cards or deal with individual configuration tools.

Cisco HyperFlex systems now support integration with enterprise shared storage systems for migration, backup, and disaster-recovery purposes. Through the power of Cisco UCS VICs, you can simply change your service profile to create a Fibre Channel HBA in each node and attach your storage system through native Fibre Channel to the fabric interconnects.

Conclusion

Only Cisco brings you complete hyperconvergence with integrated networking. Our approach gives you simplicity, quality, automation, flexibility, and adaptability.

With networking integrated into your Cisco HyperFlex cluster, you have enterprise networking built in—

networking that integrates with the data center you have today. You don't have to worry that hyperconvergence will spawn a new island of incompatibility.

With infrastructure automation from Cisco UCS technology and networking you trust from Cisco, Cisco HyperFlex systems offer the best choice for hyperconvergence.

For More Information

For more information about Cisco HyperFlex systems, visit <http://www.cisco.com/go/hyperflex>.

For more information about Cisco SingleConnect technology, please read the [solution overview](#).



Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
Cisco Systems (USA) Pte. Ltd.
Singapore

Europe Headquarters
Cisco Systems International BV Amsterdam,
The Netherlands

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.