

# Making NetApp Engineering Network Compatible with Future Systems



## Executive Summary

- **Customer Name:** NetApp Engineering Shared Infrastructure Services (ESIS)
- **Industry:** Network Storage
- **Location:** Sunnyvale, California
- **Number of Employees:** 10,000+

## Challenge

- Support need for Multihop FCoE, FC, and Ethernet access to filers running clustered Data ONTAP®
- Add new functionality quickly while maintaining network best practices and manageability

## Solution

- Allowed full Multihop FCoE, FC, and Ethernet access to storage controllers running clustered Data ONTAP using existing Cisco Nexus Series Switches and Cisco UCS Blade Servers

## Results

- Supported new FCoE, FC, and Ethernet connections to storage controllers using existing switches
- Saved US\$300,000 in hardware costs
- Saved more than \$80,000 in implementation costs and 1/3 of an FTE's time due to streamlined administration

## NetApp deploys Cisco Nexus Series Switches to address FCoE and FC support growing, high-demand network.

### Challenge

Widely recognized as one of the world's most innovative companies, NetApp is always looking for new and better ways to achieve its goals. The company's Engineering Shared Infrastructure Services department delivers and maintains end-to-end compute, storage, and network resources for internal Development and Quality Assurance engineers. These resources provide a platform for the innovation that creates storage systems and software, ultimately empowering NetApp customers around the world to store, manage, protect, and retain their data.

Chris Travis, system architect and administrator within NetApp's Engineering Shared Infrastructure Services organization, works as part of a global team to provide test and development environments for NetApp engineers worldwide.

Cisco Unified Computing System™ (UCS®) domains, Nexus® 7000 Series and Nexus 5000 Series switches are all part of these environments. "Data ONTAP®, the most widely used storage operating system, is developed in a build environment with storage running clustered Data ONTAP® and with compute and network resources using Cisco UCS and Cisco Nexus switches," explains Travis. "When the developers make changes and add functionality, at least in RTP, those changes are being done on Cisco UCS."

The NetApp network based on Cisco® tools provides engineers with access to test beds comprising more than 53,000 virtual machines, but innovation never rests. One internal customer requested the capability to simultaneously test FC and FCoE against NetApp storage controllers running clustered Data ONTAP. Clustered Data ONTAP helps enable administrators to efficiently scale out their storage networks by treating multiple high availability storage controller-pairs as one logical unit.



“In the end, Cisco enables me to do more than just deliver Multihop FCoE... Having a Cisco Unified Fabric means an integrated model that supports FCoE from the UCS Blade Servers through the Nexus Series Switches all the way to NetApp storage controllers.”

– **Chris Travis**  
System Architect and  
Administrator, Engineering  
Shared Infrastructure  
Services (ESIS)  
NetApp

For Travis’ team in RTP, supporting NetApp storage controllers in this testbed meant providing Fibre Channel over Ethernet (FCoE) functionality, as well as Fibre Channel (FC) and Ethernet connectivity between Cisco UCS C-series rack-mounted servers and storage controllers. “We were used to provisioning FCoE and FC, but now we needed to provide both,” says Travis. “The team making this request provides storage controllers to other teams, so the entire engineering group needed this functionality, and we had to deliver it fast.”

Based on his experience with Cisco, Travis knew that the functionality he needed was already built in to the Cisco switches deployed at NetApp. Turning it on would be easy, inexpensive, and fast.

### Solution

The NetApp engineering team relies on a VMware vSphere-based infrastructure that can support nearly 100,000 virtual machines running on UCS Cisco B200, B230, and B200 M3 blade servers and Cisco UCS C200 and C210 rack-mount servers. Cisco UCS 6100 and 6200 Series Fabric Interconnects provides network connectivity and management capabilities to all attached blades and chassis.

Cisco Nexus Series Switches connect NetApp storage controllers to physical machines, including the UCS B and C-series Servers, using cut-through architecture that supports line-rate 10 Gigabit Ethernet, helps enable consolidation of LAN, SAN, and cluster environments over a lossless Ethernet fabric, and connects FCoE to native FC. The shared-test infrastructure uses Nexus 7000 Series Switches for core and distribution switching and Cisco Nexus 5000 Series Switches and Cisco Nexus 2000 Series Fabric Extenders in the access layer; it also connects UCS 6100 Series Fabric Interconnects to the Nexus 5000 switches with the UCS B-series Blade Servers. Management and automation tools include Cisco UCS Manager with service profiles for rapid server deployment and VMware vCenter with NetApp Virtual Storage Console for integrated storage management.

To accelerate provisioning services in the FCoE and FC environment, Travis needed to design a network that connected the UCS C-Series servers to the clustered Data ONTAP storage controllers. He already had the Cisco Nexus 5000 and 7000 switches. At the access layer on both the filer side and the client side, Travis put a pair of Nexus 5000 switches, and connected them with both FC and FCoE. Different virtual device contexts on his distribution Nexus 7000 switches provided both an Ethernet connection and FCoE on the same switch.

The result is a Fabric A and a Fabric B for FCoE. Starting from a UCS server the FCoE connects with filers, first going through a pair of Nexus 5000 switches, then a distribution pair of Nexus 7000 switches, then a core pair of Nexus 7000 switches, then to another distribution pair of Nexus 7000 switches, then to another pair of access Nexus 5000 switches and finally to the filers.

“With multi-hop FCoE, I can connect separate parts of a building that I typically would not have been able to connect. But now, we have FCoE everywhere. Engineers don’t even have to ask, because FCoE is already turned on.”

## Results

### Better connectivity at a lower price

Travis contrasts NetApp's new multi-hop FCoE with the traditional approach to this challenge, which is to add new layers of network to existing Ethernet.

"Instead of building up a new layer of network to deliver FC and FCoE connectivity I was able to connect them through the existing Nexus 7000 switches, and I didn't have to buy additional switches to do it," Travis says. "We were able to consolidate without affecting the best practices we'd put in place for our LAN and SAN." Travis was able to isolate the LAN and SAN and put SAN into a storage virtual device context (VDC) by logically splitting each Cisco Nexus 7000.

In addition, the capability of the Cisco Nexus 5000 and Nexus 7000 switches helped enable Travis to avoid purchasing two new SANs (one Fabric A and one Fabric B) and approximately 12 SAN switches. "In the end, Cisco enables me to do more than just deliver Multihop FCoE," says Travis. "It also provides end-to-end FCoE with FCoE storage. Having a Cisco Unified Fabric means an integrated model that supports FCoE from the UCS Blade Servers through the Nexus Series Switches all the way to NetApp storage controllers."

### Smaller footprint and manageability yields cost savings

With the options provided through the Cisco environment, Travis's team was able to deploy the new connectivity faster and less expensively than he expected. NetApp has saved approximately \$300,000 in initial hardware costs by not having to buy additional switches and other technologies.

"It's easy to focus on capital cost, but typically ongoing operational and installation costs are more significant," says Travis. "We saved about 100 hours on the initial work of cabling and setup. Plus, because you can do this in a single environment without getting more switches or running different networks for it, you can manage it more easily, so we save approximately one-third of a full-time employee's time."

Power, heating, and cooling are also part of the savings. The Cisco Nexus 5000 Series Switches connect over a Twinax cable, which uses a tenth of the power of an optic cable. And with the Cisco Unified Fabric, Travis does not need to run multiple adapters in the Cisco UCS servers.

### Network agility supports business agility

The agility of the Cisco infrastructure supports NetApp's need for business agility, because it responds to changing market conditions and innovative new directions from its staff. Travis sees that agility coming from both the computing and networking aspects of the Cisco infrastructure. "The way that FCoE solves changing needs for storage connectivity is similar to the way UCS provides a dynamic solution to compute challenges," says Travis. "Both UCS and FCoE reduce the number of management points and provide easy scalability so that we can quickly tap into both computing and storage resources, wherever and whenever we need them."



## Product List

### Cisco Unified Computing System Servers

- Cisco C200 Rack-Mount Servers
- Cisco C210 Rack-Mount Servers
- Cisco B200 M2 Blade Servers
- Cisco B230 M2 Blade Servers
- Cisco B200 M3 Blade Servers

### Routing and Switching

- Cisco UCS 6100 Series Fabric Interconnects
- Cisco Nexus 7000 Series Switches
- Cisco Nexus 5000 Series Switches
- Cisco Nexus 2000 Series Fabric Extenders
- Cisco Catalyst 4500E Series GE Fiber line cards

### Network Management

- Cisco Unified Computing System Manager

In the constantly changing technology industry, it is virtually impossible to make systems compatible with future versions or predict every need in a few years. “We bought Cisco products to deliver 10 GB Ethernet, but we were able to simply turn on FCoE and FC when we needed them,” says Travis. “We didn’t have to invest in a new solution and take time to implement it because Cisco had anticipated the need for FCoE and already built it in to the Nexus 7000 platform. Because of Cisco’s foresight, we were able respond to new business needs within hours instead of weeks.”

### For More Information

To find out more about Cisco Unified Computing, please visit: [www.cisco.com/go/ucs](http://www.cisco.com/go/ucs).

To find out more about Cisco Nexus Switches, please visit: [www.cisco.com/go/nexus](http://www.cisco.com/go/nexus).



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