

Building Mission-Critical Data Centers

Benefit from an HP converged infrastructure and resilient virtual switching fabric

Business white paper

Introduction

As enterprises develop business strategies for 2010 and beyond, they require an infrastructure that can quickly and cost-effectively adapt to evolving needs. Should an innovative idea show promise, an interesting business opportunity warrant attention, or a competitive threat require a shift in strategy, they must have the ability to seamlessly position resources—servers, applications, storage, and services—across enterprise data centers swiftly, without any disruption of services.

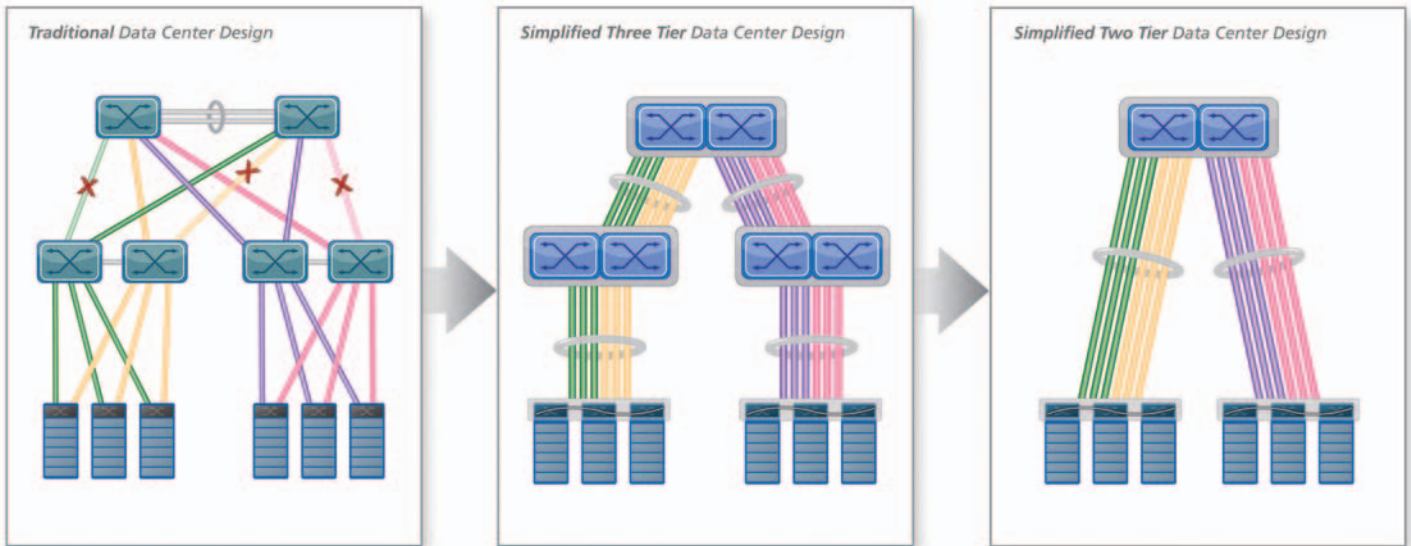
Unfortunately, many companies cannot achieve such responsiveness with their current data center network architectures. The traditional three-tier model of access, aggregation, and core switching has turned into an operational nightmare. With a variety of technologies, protocols, and management at each tier, the complexity of a legacy network can create significant management challenges for IT managers.

In addition, the switching technology inside the data center itself is often outdated. Older-generation switches may be closed, rigid, and monolithic, incapable of the agility so vital to today's business operations. They're also highly inefficient, which means they suffer from availability and performance issues while carrying high price tags for purchase, power, and maintenance.

With FlexFabric as the blueprint for an efficient, highly integrated and secure data center network, HP converged infrastructure solutions streamline the design of next-generation data centers to ensure the superior resiliency, performance, and agility that enterprise networks now require.



Building the Next Generation of Data Centers



H3C solutions overcome legacy network design limitations by helping enterprises deploy a simplified, scalable, high-performing and lower-cost resilient virtual switching fabric.

The right network fabric for modern data centers

HP uses Intelligent Resilient Framework™ (IRF) technology to enable creation of a resilient virtual switching fabric. An IRF-based converged network extends the control plane across multiple active switches, increasing resiliency and reducing complexity. A resilient virtual switching fabric can incorporate core/aggregation-based chassis and top-of-rack switches. As many as nine switches can be aggregated at the edge to build ultra-resilient switching stacks. These switches can be extended through multiple racks in a horizontal manner. This design combines scalability, performance, and resiliency, efficiently load-balancing traffic with dual-attached servers and shorter cables within each rack.

One IRF-member switch operates as the primary system switch, tasked with maintaining the control plane and updating forwarding tables for all associated switches. The associated switches provide Layer 2/3 functionality for directly connected users, as well a secondary system in the event of primary switch failure.

To simplify network design and management, a single IP address represents the associated switches. Should the primary switch fail, the system automatically selects a new primary switch, preventing service interruption and guaranteeing complete continuity for business-critical applications.

After the resilient virtual switching fabric domain is formed, a network manager can use the Intelligent Management Center (IMC) platform to manage all of the switches within the domain as a single logical switch, rather than individual physical switches. To further ease management and reduce operational expenditures, IMC software enables comprehensive administrative services, leveraging both their common operating system and the latest technologies such as AJAX, SOA, and open APIs.

No longer do managers have to connect to, configure, and manage switches individually. Configurations are performed on the primary switch and distributed to all associated switches, drastically simplifying network setup, operation, and maintenance.

Additionally, within the resilient virtual switching fabric domain, network control protocols operate as a cohesive whole to streamline processing, improve performance, and simplify network operation. For example, routing protocols calculate routes based on the single logical domain rather than the multiple switches it represents. And edge or aggregation switches that are dual homed to resilient virtual switching fabric-enabled core or data center switches “see” the associated switches as a single entity, eliminating the need for slow convergence technologies such as Spanning Tree Protocol (STP) and its evolutions (Rapid STP, Multiple STP) or redundancy technologies such as Virtual Router Redundancy Protocol (VRRP).

“... the university has become so dependent upon the electronic delivery of applications and services, high-availability is paramount ... that’s why we chose 3Com to build a high-availability network.”

Fred Tarca, chief IT officer, Quinnipiac University, Connecticut, U.S.

The geographic location of switches no longer matters within the resilient virtual switching fabric. Switches can be local, distributed regionally, or at distant disaster recovery sites and continue to function as a single logical unit. This location independence is extremely important for today’s technology-oriented businesses in which global on-demand application access and dynamic traffic flows must be supported.

HP partnerships with technology providers offer further assurance that mission-critical virtualization capabilities are available to enterprises across their resilient virtual switching fabric. IMC software helps orchestrate this seamless application mobility across the network.

Mission-critical resiliency

The modern data center must recover from network failures in milliseconds with near zero data impact. In a broad spectrum of industries—from healthcare to education, from manufacturing to transportation, from banking to government—people depend on their networks to deliver fast, reliable access to information. STP and its predecessors RSTP and MSTP, which offer

reconvergence in seconds rather than milliseconds, do not provide the resiliency and availability required of modern applications. A financial transaction that executes in 30ms or less time cannot wait one, two, or three seconds for an outdated network protocol to do its job. What’s more, complexity often means trouble for a network manager. When incorrectly designed and improperly implemented, network protocols can lead to disruptions and failures, resulting in massive outages that can halt critical networked activities.

Proven performance

HP data center networking solutions—interconnected via a resilient virtual switching fabric and designed for the most demanding business environments—minimize complexity and offer dependable performance that has been proven at some of the largest companies in the world. As an example, these solutions are being leveraged by one of China’s premiere online community destinations, Sohu.com, in a next-generation data center that will support the company’s new third-generation interactive search engine. The search engine, www.sogou.com, requires a data center platform capable of supporting the storage of billions of Web pages, an online update and rating system, concurrent and high-performance access to and from numerous server clusters, as well as flexible expansion to meet future needs.

Independent tests conducted by Spirent and The Tolly Group further verify the high performance of these data center switches. Spirent validated that the H3C S12518* data-center core switch supported 100% throughput with zero packet loss across 128 10-Gigabit Ethernet (non-blocking) ports, while forwarding Layer 2 unicast and Layer 3 IPv4 unicast, IPv6 unicast, and MPLS traffic. The H3C S12500 and S5820X access-layer switches also deliver under the same traffic conditions remarkably low latency—from 1 μ sec (in cut-through switching mode) to 10 μ sec (store and forward switching mode).

“The next-generation H3C data center solution [now represented by HP A-Series products] exhibited superior performance, availability and scalability during our field test, and significantly impressed us all.”

Qiu Wei, director of network operation and maintenance, Sohu.com inc., China

* The products referenced in this publication were developed and sold by 3Com, H3C, or TippingPoint, which were acquired by HP in April 2010. Many references to HP herein refer to 3Com, H3C, or TippingPoint or those products acquired from 3Com, H3C, or TippingPoint and not the HP product line generally.

“The S5800 is simply a tour de force of switching ... it provides us with every feature we want in a flexible edge and core switch at a total cost of ownership we’ve never seen from any other vendor. We need raw speed and it delivers.”

Dave Foss, assistant director for IT,
Massachusetts Institute of Technology,
Cambridge, Massachusetts, U.S.

The Tolly Group testing validated wire-speed performance with no packet loss while switching between the primary and backup management modules and with redundant switching fabrics—ensuring “hitless failover” of the network to avoid service interruption. In addition, the core 12500 switch demonstrated a failover time of 27.1 milliseconds for MPLS.

The resilient, virtual business

An HP data center network supports a wide range of extensible embedded services—from best-of-breed security and application optimization to virtualized networking—to help IT teams adjust quickly to evolving business requirements and rapidly enable those new services closely aligned with operational priorities.

Additional business benefits include:

- **Business continuity**—Resilient virtual switching provides exceptional redundancy and end-to-end no-fail networking.
- **Data center simplification**—With resilient virtual switching, enterprises can provide a single and consistent network fabric to support mission-critical data center applications and services. Because security and other network services are virtualized and consolidated, enterprises need fewer network platforms and are able to benefit from reduced network complexity.
- **Energy efficiency**—As validated in independent testing, modern HP system architecture consumes as much as 40% less power than legacy data center switches.
- **Lower TCO**—An HP data center network solution requires less equipment and consumes less space and power than legacy data center networks, streamlining operations and reducing cost.
- **Future-proof networking**—HP data center network solutions enable easy expansion; the same protocols, security, and management capabilities at all levels eliminate the need for rip-and-replace upgrades.

Looking ahead

Going forward, the most successful IT decision makers will be those who embrace new best-of-breed products rather than the latest limiting variant from legacy vendors. By doing so, they gain a future-proof data center network that will achieve business goals while lowering cost. Because an HP converged infrastructure is built with a fully virtualized, ultra-resilient, highly secure, and standards-based data center network, enterprises can now afford to simplify their network design and help ensure best-in-class network performance and security.

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