HP's prescription for next-generation data center networks

Business white paper

Table of contents

Overview 2
The limitations of the legacy data center 2
The needs of the next-generation data center .. 3
The HP Converged Infrastructure 4
A center of control 7
Looking beyond tomorrow 7
Why HP? 8

Overview

- Institute real-time collaborative medicine and electronic medical records (EMRs)
- Help ensure compliance
- Support increased patient volume caused by an increase in chronic conditions
- Merge infrastructure to lower costs, implement cloud computing, and reduce energy consumption

These are just some of the pressures that healthcare organizations in the U.S. and around the world are facing. The fact that they are happening simultaneously will have a dramatic impact on the entire data center infrastructure. Healthcare organizations of all sizes are expected to expand the amount and types of services they offer without driving up their budgets or jeopardizing data protection.

Many of these new applications can improve patient care and provide doctors with instant access to data so they can make split-second, potentially life-saving decisions. In this industry, there is no leeway for poor handling of massive file sizes, poor application performance, infrastructure deployment delays, traffic bottlenecks, or equipment outages.

Healthcare organizations can no longer continue to rely on legacy infrastructure that cannot by its very nature support the competing objectives of innovation, compliance, security, and cost containment. The complexity and expense that traditional data centers place on resource-limited healthcare ecosystems is far too burdensome. The proprietary and ad hoc nature of data networks make it difficult to provide the availability, reliability, and security of exciting new applications such as remote diagnostics, mobile healthcare clinics, electronic medical records (EMRs), and enhanced real-time imaging programs.

Instead, healthcare organizations that want to make advancements in this new era of improved patient care through telemedicine, mandated meaningful use of electronic health records software, digitized records, and other efforts should consider an open, standards-based data center architecture. This architecture needs to be flexible, secure, automated, affordable, and purpose built to support mission-critical, real-time, and resource-intensive applications.

HP's extensive, modular data center product portfolio addresses these very needs by driving simplicity through streamlined network designs and centralized management; enhancing agility with high performance, security, and accelerated provisioning; and saving money with energy efficiency and low total cost of ownership.

In this paper, we'll lay out the challenges healthcare organizations are facing and how HP is the right partner to help solve them.

The limitations of the legacy data center

Traditional data centers are often a complex tangle of technologies that have been strung together as new applications or users have come online. These applications have either been run on parallel networks, forcing an increase in equipment and management, or they've been put together without proper planning to run on the same network with no assurance of visibility, performance, or security. In many cases, servers, switches, cabling, and other key infrastructure have been layered on to the point that the data center is bursting at the seams in terms of rack space, energy use, and cooling.

A major IT research firm found the data center itself has gotten so complex that two-thirds of a healthcare IT organization's time, money, and effort is spent keeping systems running, the infrastructure operational, and the disaster recovery plans functional.

Such networking complexity is rooted in the way healthcare IT groups have traditionally approached new application requirements, says Phil Hochmuth, a senior analyst with Yankee Group Research in Boston. "When a healthcare organization has a new application, IT typically adds a new server cluster to the network. When the network gets congested or performance falls below par, IT adds more bandwidth," says Hochmuth.

Hochmuth advises healthcare organizations to break away from this architectural model with its cycles of adding and upgrading infrastructure. Hochmuth notes that this approach is "too costly and doesn't solve the underlying network issues."

The need for change is evident. Even the traditional three-tier, physically oriented infrastructure models of access, aggregation, and core switching are in need of a makeover. The different protocols, technologies, and management at each tier increase the complexity of legacy networks and aggravate the inefficiencies of performance resources. Management becomes more difficult and security concerns multiply.

In addition, many healthcare organizations are locked into proprietary and costly systems that are difficult to scale and maintain. Healthcare organizations are expecting to see a sizeable increase in the number of patients coming into the system as well as applications that need to interact seamlessly with data from existing

programs. Such a lack of interoperability creates obstacles to deploying life-changing applications such as EMR, which aggregates data from multiple systems to show a holistic patient view, including allergies and drug-drug interactions.

There is also a heightened expectation of cross-enterprise visibility so that industry and government compliance mandates for data protection can be met and, in the U.S., meaningful use can be delivered. It can be difficult to respond to threats and report to auditors if legacy networks are disjointed and siloed and fail to provide a clear view of the health of enterprise components.

The needs of the next-generation data center

The next-generation data center enables healthcare organizations to automate, virtualize, and streamline administrative and medical activities. A successful architecture addresses three key areas: infrastructure, security, and management. It facilitates the rapid provisioning of network resources to support mission-critical and revenue-generating applications.

In this scenario, data center infrastructure automatically configures, deploys, recognizes, and load balances among all components, including switches, across the entire network. It also seamlessly fails over to other switches, as well as other components, in case of a hardware failure or a disaster.

Healthcare organizations need a more practical and cost-effective approach to the legacy architectures of today. This includes a "pay-as-you-grow" modular strategy that avoids protracted deployment cycles and costly contracts.

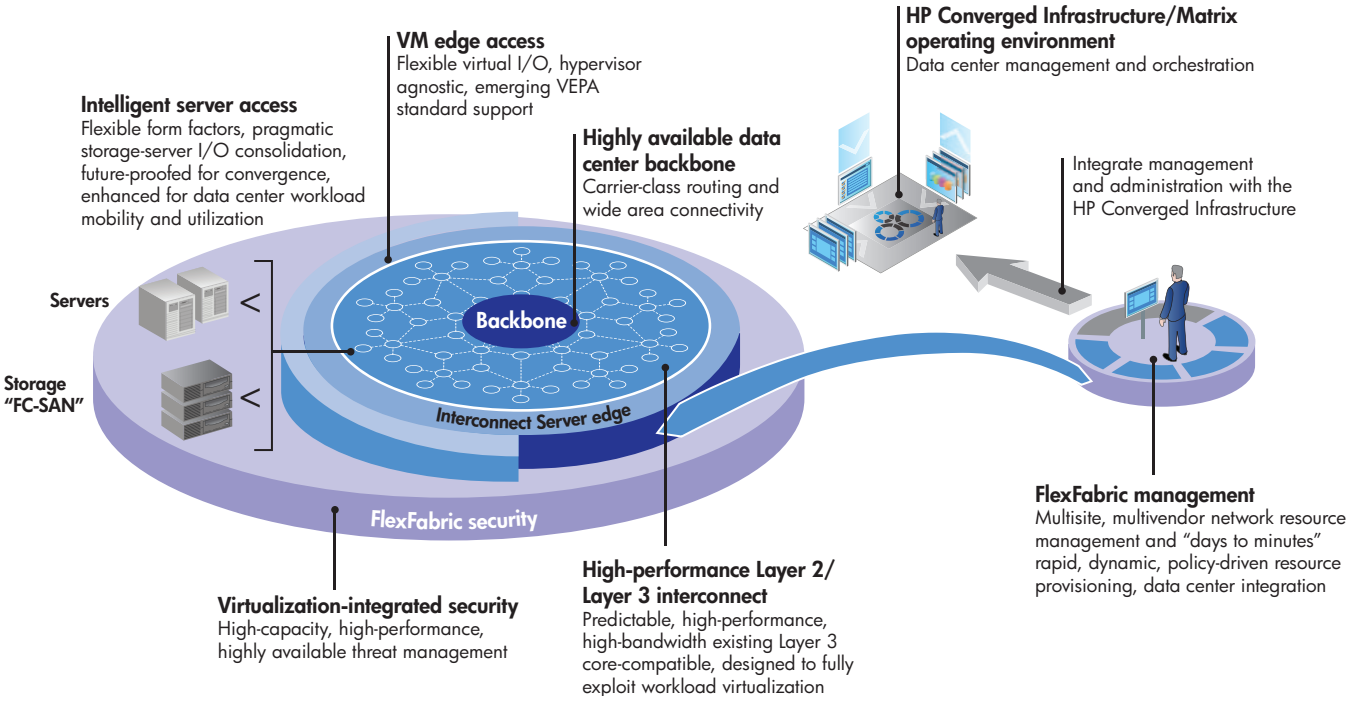
Because there is a tremendous amount of merging of entities and consolidation of network architectures occurring throughout the industry, healthcare organizations require a scalable data center solution that features tools to deploy, manage, and secure the wired and wireless network from a centralized console. Such control is important for auditing and reporting, consistent policy enforcement, automated dispatching of patches and updates, quick alerts and remediation of problems, reduced management costs, and rapid provisioning of resources. Centralized management is also helpful in redirecting limited staff resources away from routine maintenance tasks to strategic projects.

Resiliency is a key element of a successful next-generation data center. Because applications are growing, but infrastructure is also consolidating, networks must be kept up and running. These networks will carry real-time images that surgeons depend on during critical procedures and which specialists in another country or at another hospital will use to help rural facilities deliver a higher level of care. There is no tolerance for downtime due to outages, failed equipment, or routine maintenance.

In the next-generation data center, the concept of technology silos disappears and instead a meshed fabric of pooled resources arises. No longer do healthcare organizations need specialized skills to run islands of equipment. Instead, all wired and wireless network technology interoperates, is visible from a centralized console, is policy driven, and is based on open standards that rely on common skill sets. This enables organizations to make the most of their technology and staffing investments.

Last, but certainly not least in today's environment, an advanced data center architecture is laser focused on delivering efficient power and cooling. It takes into consideration cutting-edge and cost-saving ways to cut energy consumption without affecting the quality of application delivery.

Figure 1
HP FlexFabric architecture



The HP Converged Infrastructure

With HP networking solutions as a cornerstone, the HP Converged Infrastructure delivers an architectural blueprint that integrates servers, storage, and networking, eliminating technology silos in the data center and freeing up resources to focus more on business innovation. It directly addresses the three key areas of success mentioned earlier: infrastructure, security, and management.

Standards-based solutions speed the rollout of network services and new applications without jeopardizing compliance, performance, and data protection. Networking components are designed to ease management, eliminate bottlenecks, and interoperate with third-party solutions. By streamlining network designs and centralizing wired and wireless management, healthcare organizations lower total cost of ownership while improving their operational agility with secure, high-performance connectivity, cost-saving scalability, resource-stretching provisioning, and decreased energy consumption.

The modern application- and service-ready HP FlexFabric networking architecture—a primary element of the HP Converged Infrastructure that connects data center server and storage resources—quickly adapts to changing business requirements by dynamically scaling capacity and provisioning connections to meet application demands "on the fly." Mission-critical applications have the resources they need and are not impacted by the deployment of new applications. For example, IT can help ensure that a new laboratory application will not impact the performance of a digital imaging application used during surgery.

HP networking solutions are purpose built to reduce downtime, keeping members of the healthcare ecosystem, including patients, providers, and payers, connected to mission-critical applications and each other. They are ideal for organizations that must reliably and consistently support existing applications as well as deploy innovative new ones.

HP Intelligent Resilient Framework (IRF) technology enables less complex network designs and easier-to-manage infrastructure to help ensure that mission-critical applications, like those used for surgery and remote diagnostics, are not negatively impacted. IRF is a virtual switching fabric that delivers geographic independence, distributed high availability, resiliency, and millisecond reconvergence across Layer 2 and Layer 3 protocols. With IRF-based solutions, IT teams can pool switching resources to create a lower-cost, stable, fault-tolerant environment that is simpler to provision and maintain. Within this comprehensive networking environment, the HP Virtual Connect family of technologies, which work at the server

Figure 2
Three-tier network architecture

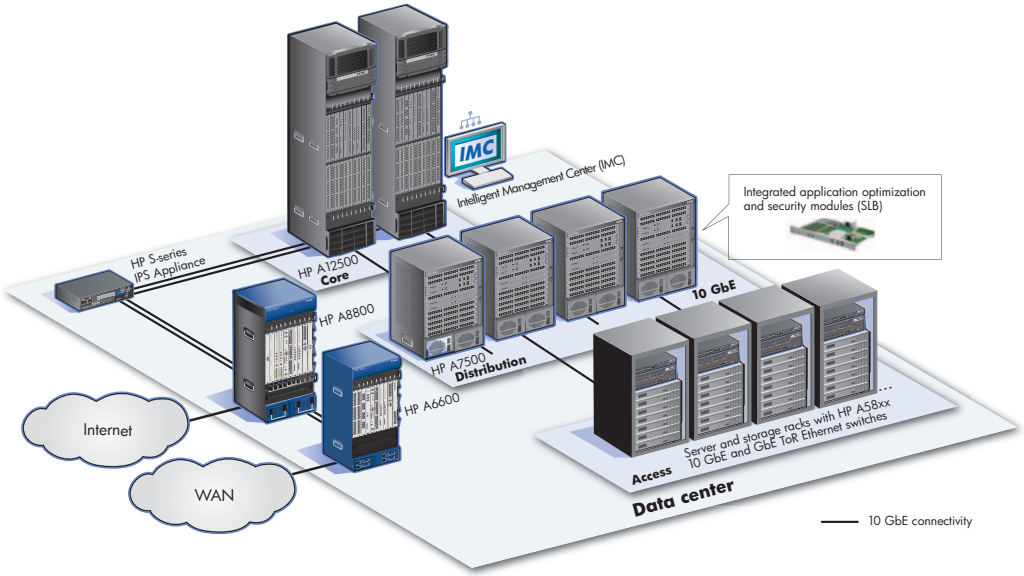
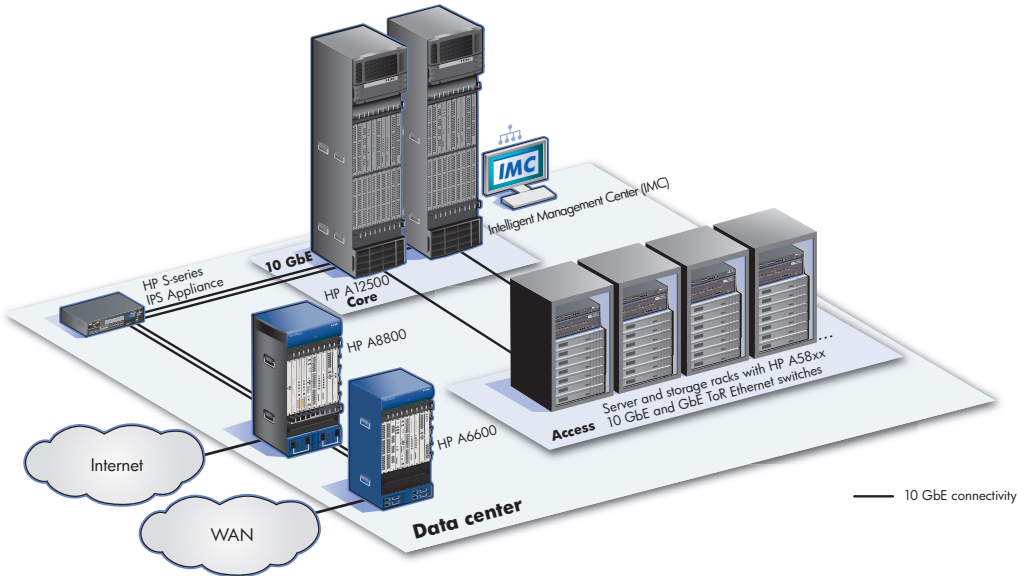


Figure 3
Two-tier network architecture



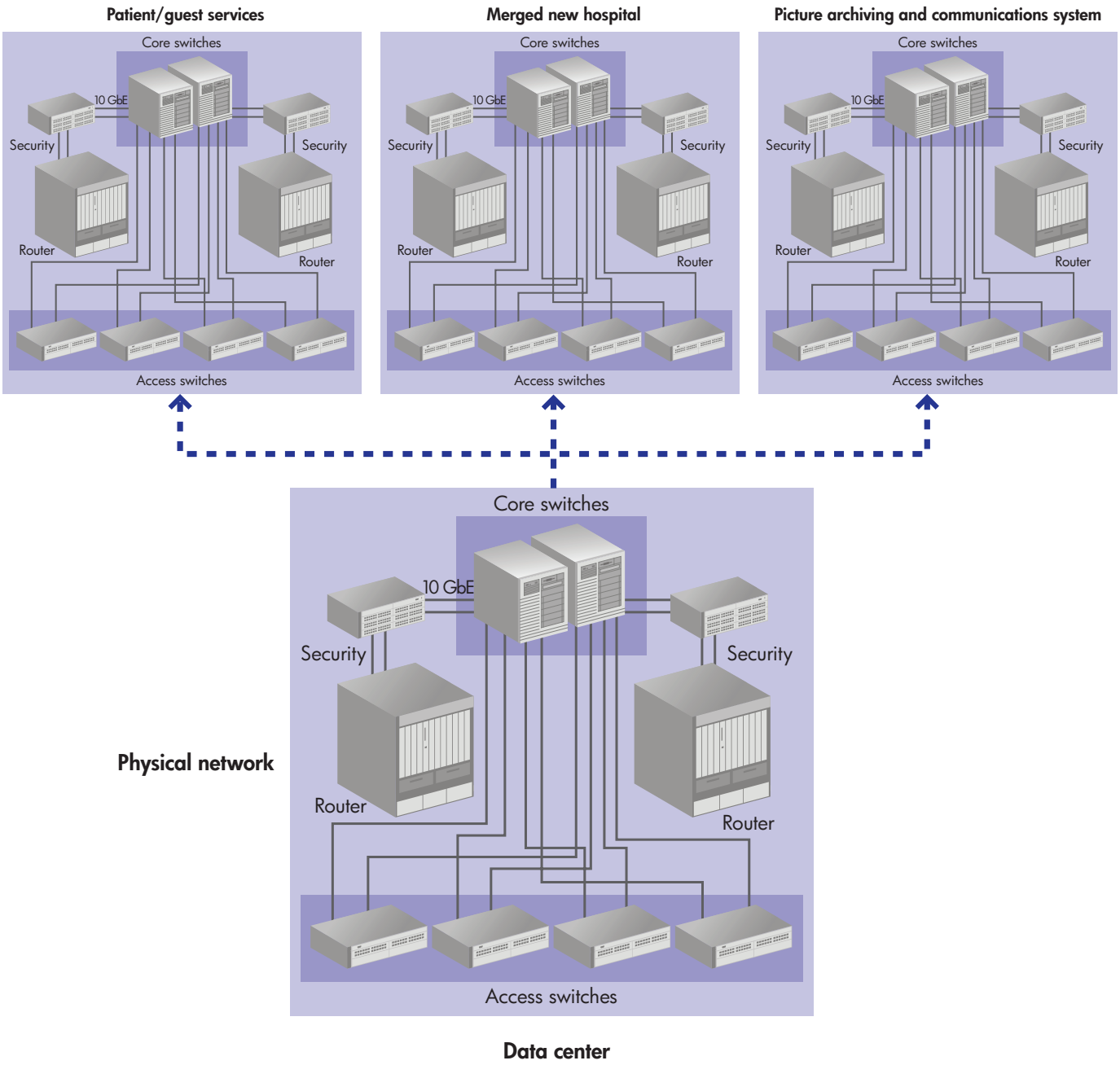
edge, transforms a single port into four connections to enable the use of copper or fiber connections. IT teams can use Fibre Channel over Ethernet-capable switches to allow native Fibre Channel—a staple of the high-performance data center storage network—and standard network traffic to run alongside each other over a 10 Gigabit Ethernet infrastructure.

HP management solutions orchestrate service delivery to accelerate innovation. Virtualization capabilities of the HP FlexFabric architecture consolidate multiple protocols into a single fabric, dramatically reducing network complexity to enhance performance and increase the productivity and responsiveness of IT staff. Policy-driven provisioning capabilities are tightly integrated with server and storage management, further streamlining management. In addition, centralized management tools, such as HP Intelligent Management Center software, help IT staff to be more productive and effective.

Virtualization and orchestration capabilities enable healthcare organizations to take full advantage of their switching infrastructures without overprovisioning them to meet the needs of peak traffic. With HP networking solutions, healthcare organizations can create a switching network that supports exciting new applications on the fly to save time and money, and allow IT staff to focus on more strategic initiatives.

Virtualized networks

Virtualization capabilities enable a healthcare organization's IT staff to partition a physical network into multiple logical networks, each with distinctive features such as independent policies, quality of service, bandwidth, and security.



Central to an agile network infrastructure are HP's policy-driven provisioning capabilities that are tightly integrated with server and storage management. HP's portfolio of network and FlexFabric architectures can be easily managed with centralized management tools and other unified features that simplify IT's role.

To avoid vendor lock-in, HP provides a modular strategy that enables IT to expand its environment as necessary and economically foster innovation. Built on open, standards-based technologies, HP solutions integrate with existing infrastructure to make the most of current investments. Organizations can deploy HP products in a "pay-as-you-grow," intelligent, and cost-aware manner that helps build support for future buildouts.

This unique approach and the fact that there are no hidden fees for proprietary upgrades also help lower acquisition costs. In fact, HP's customers report up to a 66% lower total cost of ownership.[1]

In addition, the use of service blades, a modular architecture, and common components further lower costs by decreasing the number of required spares, distinct networking products, and maintenance overlays.

A center of control

As many in the healthcare industry consider how best to consolidate their infrastructures, they are challenged by the need to manage and secure disparate systems. Addressing these issues is critical because lapses in management can lead to security breaches and network outages that have serious repercussions such as disclosure of patient data, delays in supplying doctors with critical information, and billing errors.

HP offers unified features and integrated networking components that enable IT to consolidate and centralize network management of both wired and wireless networking components while maintaining a clear view and control of the environment. IT can easily view fixed and mobile network devices that are running and make sure they are up to date with proper patches and security. In addition, HP management tools allow only authorized users to access network data and resources. They set and enforce global policies for both network and security devices; apply authentication; provide encrypted system management access; and deliver quarantine enforcement and other security techniques at the network, device, and user levels. Integrated and centralized tools also improve traffic management so that real-time applications are allotted the high priority and low latency they require.

To combat security threats and breaches, including increasingly sophisticated hackers that use bots, zombies, and popular peer-to-peer applications to bypass peripheral security devices, HP solutions deliver comprehensive security featuring industry-leading HP TippingPoint vulnerability detection capabilities and intrusion prevention solutions backed by global Digital Vaccine Labs (DVLabs). An Infonetics survey found that 76% of customers deploy HP TippingPoint solutions in less than two hours and report blocking 2.3x more threats as compared to the nearest competing solutions.[2] This unprecedented level of network-wide protection provides IT with critical visibility and control, helping address increased compliance requirements, such as those within the Payment Card Industry Data Security Standard.

Looking beyond tomorrow

Built on industry-leading technologies and platforms, HP networking solutions enable healthcare organizations to meet future enterprise challenges. HP switches, security, and management are all designed to prepare organizations for exciting new technologies and protocols, including support for Fibre Channel over Ethernet; cloud computing; and 10, 40, and 100 Gigabit Ethernet. With the HP portfolio, they will be able to take advantage of these and other advances, including server virtualization, I/O virtualization, and desktop virtualization, without having to rip and replace hardware as they migrate to evolving technologies.

Additionally, HP networking solutions are designed to easily scale so that IT can consolidate network, server, and storage architectures. HP network switches can automatically be recognized, configured, deployed, and added to a virtual resource pool using centralized management tools with single-pane infrastructure visibility.

---

[1] "ROI of Ethernet Networking Solutions," IDC White Paper, October 2010. Savings included reduced downtime and the cost of user productivity lost from security incursions. In addition, HP delivered power and space savings—lower costs for power and heating, ventilating, and air conditioning (HVAC), as well as more efficient use of leased commercial data center space. Lower total infrastructure costs included the cost of purchasing and maintaining networking hardware and software, and IT staff savings focused on those who directly support networking hardware and end users.

[2] Based on Infonetics Survey, September 2008.

There is no doubt that in upcoming years there will be even greater pressure on organizations to be more energy efficient. HP's technologies are geared toward reducing power consumption through I/O consolidation and energy efficiency engineering. Implementing energy-wise performance and having fewer boxes requiring power can help companies save on power and cooling, rack space, cabling, and overall real estate requirements. In fact, the reduced power consumption that comes from using fewer NICs and switches can provide relief to data centers that are reaching the limits of their power and cooling envelopes. With a typical rack of 20 servers and a typical Fibre Channel HBA consuming roughly 12.5 watts, as much as 500 watts can be saved by eliminating two interface cards per server. If the energy needed to cool the rack is also computed, the savings can be doubled to 1000 watts per rack.

As technology continues to drive information sharing and data storage, there also will be continued demand for business continuity and disaster recovery. HP IRF, which transparently enables automatic failover between switches, can play a key role in protecting hospitals and other healthcare entities during disasters. No downtime means no interruption in critical care services to patients.

Why HP?

Healthcare organizations need an infrastructure that will promote agility and boost productivity without sacrificing performance, raising costs, or impacting security. They cannot depend on their legacy networks nor can they rely on maintaining a status quo approach to service delivery that will address these requirements. IT teams that want to consolidate, while at the same time take advantage of exciting technologies such as server and desktop virtualization and cloud computing, must rethink how they build their networks.

As an example, the world of imaging has become so advanced that healthcare providers are able to forego the risks of invasive discovery procedures and depend upon technology to provide them with the information to make life-changing decisions. However, this level of technology has massive data transfer requirements, which results in the need for exponential bandwidth. The HP family of A-Series products is ideally architected to handle large files such as MRI and CT scan images and offer two to three times better performance than competing vendors.

In addition, the HP Converged Infrastructure with FlexFabric networking architecture drives simplicity through streamlined network designs and centralized management; enhances agility with high performance, security, and accelerated provisioning; and saves money with energy efficiency and low total cost of ownership. HP has the knowledge, experience, and product portfolio to help healthcare organizations gain control of their networking infrastructures now and into the future while they provide improved care for their patients.

Share with colleagues

Get connected
www.hp.com/go/getconnected
Get the insider view on tech trends, alerts, and HP solutions for better business outcomes

© Copyright 2010 Hewlett-Packard Development Company, L.P. The information contained herein is subject to change without notice. The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

4AA3-0728ENW, Created December 2010