Continuous App Delivery in Scale with Cloud-first Networks

Hewlett Packard Enterprise

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Introduction

Big data and an explosion in network traffic are putting pressure on today's data center networks. Our increasing dependence on digital technologies as part of our work and business processes, as well as the expected pace of enabling new business apps is placing heavy demands on legacy data center infrastructures. As the private and secure information that businesses rely on moves to digital, it's critical that data center networks stay strong and offer the highest level of reliability.

Reliability is usually thought of as a contradiction to the ability to move fast, but as companies continue to automate operations in the data center, they're able to move the network at the speed of "business app" delivery and deployment, without giving up on what's essential — the need for the data center network to eliminate downtime and keep up with the fast pace of business.

At HPE, the common theme we are seeing across the board is the need for customers to innovate faster than ever before, while moving their business and everyone in it to digital technologies as quickly as possible. And customers' expectations from the network is simple — minimize downtime, avoid data loss, and eliminate application disruption.

120 —

—

4 —

2010 2016

Enterprises will deploy 120 app releases per year – that's up from 4 in 2010.[1]

[1] http://www8.hp.com/h20195/V2/GetPDF.aspx/4AA5-6143ENW.pdf

Data Center Networks are Under Pressure

There are three major factors that are pushing data centers to their limits and causing IT leaders to look for alternatives to traditional legacy architectures.
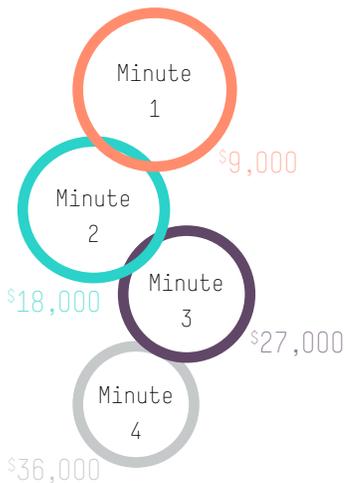
Knowledge workers demand continuous app delivery

Knowledge workers are the basic capital resource for today's economy. They use traditional apps that are designed to support existing business processes such as supply chain or web infrastructure, as well as new digital services to enable faster R&D, improve business operations with big data analytics, or offer services to improve customer engagement and experience, to name a few. One thing is common among all — the majority of the digital data that these knowledge workers interact with needs to remain private and secure, within the hybrid data center infrastructure.

Let's look at a few use cases that demand a high level of availability and fast service delivery from the data center network.

• At DreamWorks, the data center infrastructure has to provide the lowest possible latency and significantly improve transfer speeds for real-time collaboration of 200,000 digital renderings per day. A reduction in unplanned outages translates to significant cost savings, with reduced overtime work for the staff.

• The Max Planck Institute for Gravitational Physics – where the discovery of gravitational waves took place — depends on their data center for their compute-intensive R&D simulations.

• 500+ Levi's stores in 33 countries publish digital product information to in-store digital displays centrally and allow for retail staff to operate point of sale stations. Levi's is reporting >80% reduction in year-over-year P1/P2 outages, giving the organization the confidence to deploy innovative digital projects to boost customer engagement.

• To get access to real-time data in financial markets, The Colonial Companies require excellent performance for Citrix thin clients facing their end users.

One thing is common among these examples — they all demand a high level of availability and fast service delivery from the data center network — downtime is unacceptable.

Unplanned outages cost up to $9,000 per minute of downtime.[2]

Minute 1
$9,000

Minute 2
$18,000

Minute 3
$27,000

Minute 4
$36,000

[2] http://www.emersonnetworkpower.com/en-US/About/NewsRoom/NewsReleases/Pages/Emerson-Network-Power-Study-Says-Unplanned-Data-Center-Outages-Cost-Companies-Nearly-9000-Per-Minute-.aspx

Everything digital adds to the perfect storm

As work processes are digitized, interactions with business processes happen on a variety of digital interfaces in terms of data entry, consumption, and compute. Digital devices can include Internet of Things (IoT) devices like connected security cameras, thin clients providing access to virtual desktops (VDI), desktop or laptop based workstations for design and computing projects, digital signage systems that are dependent on highly available data centers for data access, and many more. The innovation cycle for these new digital devices is also growing at a rapid pace — disrupting and improving business workflows.

Although, the network traffic generated by individual end devices is small, their combined traffic adds pressure to the data center. As different applications come with different bandwidth, latency and storage requirements in the data center, server virtualization and container-based deployments take charge to do more with less. This places greater demand for network capacity and reliability to support server-to-server and server-to-storage communication within the data center.

Infrastructure decisions now go beyond IT

In the old days of cube farms and traditional networking infrastructures, central IT called the shots and business decision makers had little say about networking investments or app deployments. IT was traditionally seen as a cost to the organization, and one of the CIO's key tasks was to protect the interests of the IT department. Today, given how important digital transformation is to the growth of any organization, enterprises are realizing that priorities for their business has a direct correlation to priorities and requirements for IT. While CIOs and network managers used to be in control of IT budgets, other stakeholders now have a say in the decision-making process.

These include:

- **Dev/Ops** – where continuous development and deployment models are the norm, and they have no patience to wait for technology vendors to deliver their next release of software to get their projects moving.

- **Marketing** – where they often make decisions without consulting IT (usually known as shadow IT) — leading to a range of security and other IT headaches.

- **Cyber security and corporate compliance** – they need their security policies to be easily implemented within the infrastructure, regardless of how complex those policies are. Security needs to adapt to constantly changing traffic patterns, to the dynamic consumption model, and must be consistent for virtual machine (VM) to VM, client to app, and app to app traffic.

- **Chief Digital Officer (CDO)** – who must enable IT to take existing processes and applications and replace them by smart devices and software.

- **Workplace productivity teams** – who might use virtual desktop interfaces (VDI) for their labs, kiosks, or call centers in the enterprise. In the healthcare industry, doctors and nurses also use VDIs to quickly access patient data.

- **Finance and facilities teams** – they're aware of the fact that the cost of operating a data center is directly correlated with the power and cooling costs for the infrastructure. They need a technology solution that is efficient and does not break the bank.

As a result, the role of the network manager and networking team is moving from "keeping the lights on" with regard to network connectivity to being a true partner in business strategy and revenue generation.

Infrastructure operational expense can by reduced by more than 50% with software-defined data center technologies.[3]

[3] http://www.vmware.com/files/pdf/techpaper/Technical-whitepaper-SDDC-Capabilities-IToutcomes.pdf

Five requirements for IT organizations

In order to quickly respond to these pressure points and turn associated challenges into opportunities, we believe that IT decision makers need to take the following actions within their data center networking infrastructure.

1. Automate network operations

As virtual machines and containers become the norm for hosting workloads, networks have to be virtualized and automated to deliver the same level of flexibility.

Network virtualization allows the same level of agility that we have come to expect from the other components of the data center infrastructure. To really tap the full potential that automation and orchestration can offer, enterprises should consider a vendor that can provide end to-end-solutions from the orchestration layer all the way to the network that supports it.

Software platforms for network configuration management, security policy and quality of service controls should be able to work in heterogeneous environments, enabling network operations teams to migrate away from traditional infrastructure on their own terms, while minimizing downtime in their existing deployments.

2. Futureproof network capacity

The amount of traffic moving through data centers — across servers, virtual machines, and containers — is only going to increase. Therefore, it's important to futureproof network capacity with 25/100 GbE connectivity and ensure disruption-free high availability.

Futureproofing with 25/100 GbE allows companies to save real-estate, power, and cooling costs through a more efficient use of commercial space for data centers. Deployments can be optimized for VM migration by utilizing large-scale, flat L2 networks, eliminating the need for a dedicated aggregation layer and providing more direct, higher capacity connections between users and network resources. This increases resiliency and reduces the overall complexity for management.

3. Reduce operational complexity

When companies reduce the operational complexity of their network by simplifying management of separate storage area network (SAN) and the IP based local area network (LAN) for server connectivity, they're able to realize significant cost reductions. At HPE, we're seeing many of our customers realize up to 50% reduction in OpEx by consolidating their edge infrastructure with converged switching platforms. This allows organizations to spend more time on what matters — supporting new digital applications — rather than investing time and resources in legacy network infrastructures.

4. Enable disruption-free data center migration

As companies grow, they need to expand to multiple data centers that are often geographically separate. If the demand for increased scale is not a reason, local and regional compliance requirements might mandate that companies maintain digital data for global business in different corners of the world.

As a result, IT teams are required to invest in disruption-free data center migration and disaster recovery strategies to prevent outages in the delivery of existing applications. These strategies should be compatible with multiple sites that are connected to each other across Internet broadband wide area network (WAN), significantly reducing CapEx, compared to expensive private leased lines between different regions.

5. Deliver developer friendly infrastructure

With the increasing number of in-house apps deployed within private data centers, DevOps teams take charge in programming the underlying networking infrastructure. And there comes a time when they will simply not have the time to wait for the infrastructure vendors to provide their next software release, in order to support new deployment models, offer new functionality.

In order to serve the needs of the DevOps teams, data center infrastructure decision makers will have to move to a disaggregated software and hardware model for networking. This will enable their IT organizations to move their data center operations to web-scale and will deliver increased peace of mind when it comes to security of the end-to-end implementation, due to increased levels of control.

"The network in DCO2 is running well — the support team haven't received any network-related tickets since we went live six months ago. We are very happy that we took the decision to purchase this strong HP Networking solution; we are a very happy customer."

- Janjoris van der Lei, CEO, Datacenter Oostkamp

HPE Cloud-first Networks

HPE is in a unique position to provide end-to-end solutions for any private data center or hybrid infrastructure deployments. Couple that with high-density, ultra-low-latency HPE FlexFabric switches, Proliant servers are optimized to meet the needs of new compute models within the private cloud. For web-scale deployments, Cloudline servers and HPE Altoline switches offer unique differentiation for DevOps teams.

While the reference architecture is based on these components, using our complete portfolio of servers, storage, and switches, companies can tailor the best solution to meet their specific needs. Multi-vendor software capabilities also gives IT the ability to innovate and migrate to new best of breed solutions on their own terms, and allows our portfolio to easily integrate with existing data center infrastructures.

HPE's data center networking portfolio starts with best in class switching products that offer core and edge (top of rack) connectivity. The HPE FlexFabric portfolio uses an integrated Comware operating system and enables large scale, highly available network design in private data centers. On the software side, end-to-end policy definitions on multi-vendor server, networking, and storage infrastructures are enabled with the HPE Helion OpenStack platform. Security and QoS policy enforcement on multi-vendor network infrastructure are enabled with HPE's Distributed Cloud Networking (DCN) network virtualization solution. For multi-vendor network infrastructure management and configuration, HPE Intelligent Management Center (IMC) offers network operations teams the consistent visibility and actionable data needed to extract the highest performance from the network.

The FlexFabric infrastructure can also be programmed via DevOps tools like Python, Ansible and allow IT teams to configure complex networks and associated policies in minutes. If the DevOps team needs more control over network functions and wants to define their own release cycle for networking software within the infrastructure, the HPE Altoline portfolio enables disaggregation of hardware and software at the edge (top of rack). Today, Altoline supports third party network operating systems from Pica8 and Cumulus to satisfy the needs for continuous development in the data center.

HPE's ability to offer flexible and open solutions have been a clear differentiator in the marketplace. Our leadership on this front continues as we partner with other industry leaders on development efforts for OpenSwitch — an open-source network operating system targeting composable infrastructure deployments with an architecture that's community powered, modular, and secure.

With open source networking, DevOps teams can tailor their network functionalities to their business needs with the peace of mind of a community powered, modular OS. In an open source environment, with a vibrant community of engineers measuring the efficiency and capabilities of the software at great lengths, the end result is also inherently more secure. An open source approach also lowers overall software costs — instead of paying royalties, customers pay for service on-demand, which reduces capex. And thanks to its modular design, open source network OS can operate in a way that fully uses the capacity of the underlying hardware.

Attributes of a Cloud-first Network

- Simple to deploy, 25/100GbE capable and reliable fabric that's easy to scale

- Instant policies with heterogeneous software to abstract network complexity

- Open at every layer with programmability extending beyond proprietary tools

- Transformative management layer that integrates with any network infrastructure

- Composable on-demand to support web-scale deployments as a fluid asset

Conclusion

Today's legacy data centers are under increasing pressure from big data and an explosion in overall network traffic. Our increasing dependence on digital technologies as part of our work and business processes, as well as the expected pace of enabling new business apps is placing heavy demands on data center infrastructures. As the private and secure information that businesses rely on moves to digital, it's critical that data center networks remain strong when downtime is simply not an option.

HPE Cloud-first Networks portfolio takes advantage of, and is fully interoperable with, open industry standards, offering reliable connectivity to business apps in hybrid cloud infrastructures. They serve traditional data center environments while meeting the demands of web-scale data centers with open and software-defined networking.

To learn more, go to **hpe.com/networking**

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