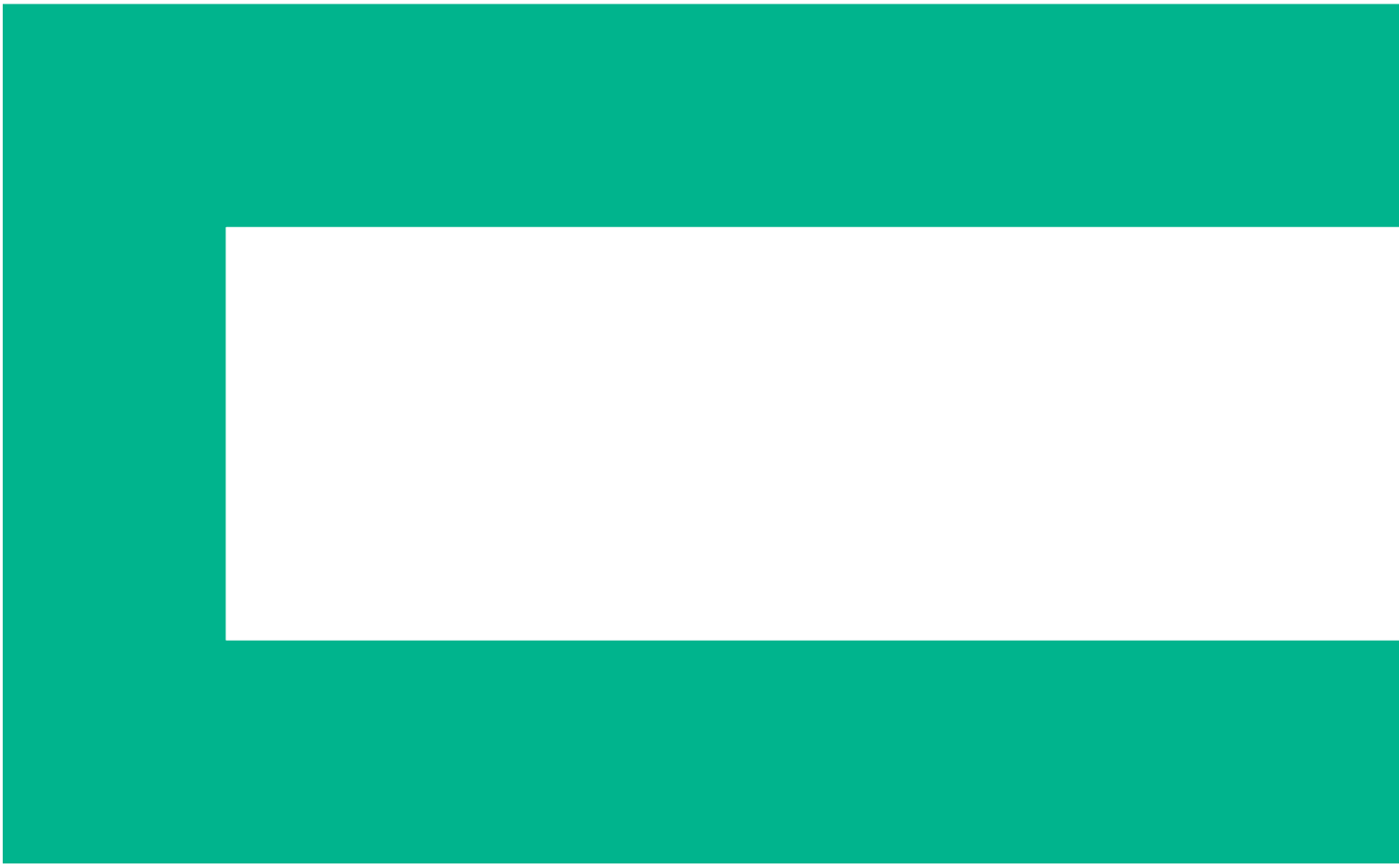
Hewlett Packard Enterprise

Business white paper

The right server for NFV

What you need to succeed with Network Functions Virtualization



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Introduction

Communications Service Providers worldwide are facing an exponential increase in traffic due to the rapid growth of over-the-top (OTT) video providers and social media applications. These competitive threats are forcing CSPs to expand their network infrastructures in a business environment that's already burdened by slow subscriber growth, and in some cases, declining average revenue per user (ARPU).

More and more CSPs are responding to these challenges by moving to a layered, virtualized application model that has been proven in enterprises to offer significant benefits in terms of cost, agility, innovation, and vendor independence. By separating the network functions into independent layers, CSPs can make their networks more flexible, increase capacity, and deliver new services more cost effectively, resulting in a significant reduction in both CAPEX and OPEX. Just as data center virtualization has radically transformed traditional IT technology and cost structures, **NFV** is now bringing similar benefits to the telecom industry.

Executive summary

With Communications Service Providers (CSPs) exploring new approaches to an increasing number of business challenges, Network Functions Virtualization (NFV) offers an effective and affordable solution to many of these challenges. To successfully transition to a virtualized environment, a CSP must address several key issues including:

- Planning and completing a telecom network/IT data center infrastructure convergence
- Evaluating and selecting the right NFV servers
- Training staff in new systems and procedures
- Defining and deploying new management tools

While pivoting long-established services and operations to an IT-style environment marks a fundamental change for any CSP, the transition's long-term advantages will ultimately dwarf its initial cost and effort. Telecom operators that embrace virtualization gain a pathway to financial and competitive benefits as well as greater efficiency, more capacity, tighter security, enhanced customer service, and future innovation.

Transforming the telecom industry

NFV is a transformative technology that offers telecom operators compelling service agility and cost-saving benefits. It also offers CSPs the ability to achieve a cost model that enables them to compete against the threats posed by OTT Communications Service Providers that are currently gaining market share in the telecom industry.

NFV allows telecom operators to replace purpose-built, proprietary network appliances with highly scalable, virtualized software applications that run on pools of general-purpose, high-volume IT servers, storage, and networking platforms. This widens vendor selection options and enables telecom operators to run multiple applications from different independent software vendors (ISVs) and network equipment providers (NEPs) on the same carrier-grade hardware platform.

Converging telecom network and data center infrastructure
When CSPs embrace NFV and data center virtualization, they are also converging their telecom network and IT data center infrastructures. By adopting the same type of flexible, high-volume server and **networking technologies** already used in large enterprise IT organizations, CSPs can reduce costs and quickly bring their users a wide range of new services.

To successfully converge telecom network and data center infrastructures, CSPs need highly scalable and reliable enterprise IT servers with solid IT system management capabilities that comply with both IT and telecom-industry standards.

What to look for in NFV servers

An NFV server needs to support a complete range of operating systems (OSs), hypervisors, **cloud computing** platforms including OpenStack®, and an extensive array of telecom software applications. These telecom software components and applications then must be optimized to handle the high volume of packet processing that is demanded by telecom control and data plane tasks in areas such as encryption/decryption, quality of service (QoS), and transcoding.

A server that's at home in any environment
To efficiently host data plane applications such as firewalls, load balancers, and content delivery networks (CDNs), an NFV server must be equally at home in the central office (CO), network data center, or IT data center. In a CO environment, NFV servers must support –48VDC, may need to be network equipment building system (NEBS) certified for safety and reliability, and must support application availability of 99.999 percent or greater.

In order to attain an application-independent infrastructure for deploying NFV virtual network functions (VNFs), it is important to have a reliable NFV server platform in all telecom environments, including both NEBS and non-NEBS installations.

Tuned for intense packet processing
To optimize NFV data plane application deployments, an NFV server must be precisely configured and tuned to handle high volume packet-processing applications. The server should also support the industry's leading packet-processing software, such as Data Plane Development Kit (DPDK). These technologies enable a wide range of new server-based network application capabilities. For example, in security where it is essential to remain agile, current, and in complete control, these applications can now be deployed on industry-standard servers.

Don't overlook ease of management
Regardless of the environment, having a pool of trained system operators is essential. Although industry-standard hardware doesn't demand very much in the way of vendor-specific training or certification, it is critical that operators have access to state-of-the-art tools that enable them to effectively manage the mix of telecom and IT infrastructure in their network.

Efficient IT management infrastructure technologies will enable operators to manage even the largest NFV deployments using methods similar to those employed by IT data center operators. This type of IT-oriented approach makes it easier for smaller telco-focused ISVs to deploy applications within the telecom environment, providing the CSPs with access to a broader ecosystem of innovation.

Key management capabilities

Easy, seamless systems management is essential to ensure a virtualized environment delivers maximum performance and efficiency. Without effective systems management, it's impossible to provide reliable, consistent services and reach anticipated performance goals.

CSPs should look for a comprehensive management platform that offers tightly integrated physical infrastructure management (PIM) and virtual infrastructure management (VIM). The management platform also needs to support fault, configuration, accounting, performance, and security (FCAPS) model and framework. Built-in support for the management of key NFV tools such as OpenStack and the NFV Orchestrator is also important. Overall, the management platform should provide end-to-end IT business management, system architecture scalability, and the ability to easily accommodate new technologies and infrastructure.

Other important management features to consider include:

- In-service upgrade capabilities, including basic input/output system (BIOS) upgrades
- Live migration of NFV workloads
- Full security protection for the program store and hypervisor: authentication, authorization, and accounting (AAA) security for the configuration and control point
- Advanced management and orchestration capabilities for meeting carrier-class operations requirements for availability and affinity models
- Hardware events are elevated throughout the stack and made available to the management and orchestration (MANO) layer of NFV
- Fast and easy provisioning of hardware and software components

HPE servers: enabling NFV innovation and performance

Hewlett Packard Enterprise is an NFV innovator and leader with an extensive portfolio of servers for NFV and software-defined networking (SDN) deployments along with many other telecom applications. Hewlett Packard Enterprise is investing heavily to optimize **HPE ProLiant** rackmount servers and **HPE BladeSystem** blade servers for NFV along with telecom data plane applications in both central offices and data centers. HPE servers provide the flexibility, power, efficiency, cost savings, and system management capabilities that are essential for success in today's challenging telecom market, making them ideal for a range of NFV and SDN applications.

To ensure NFV and other telecom applications achieve maximum packet-processing throughput, Hewlett Packard Enterprise is working closely with leading providers of high-performance network interface controllers (NICs) such as Emulex, Intel®, Mellanox, and QLogic. Hewlett Packard Enterprise also optimizes key technologies such as Data Plane Development Kit (DPDK), 6WIND's Virtual Accelerator, and 6WINDGate to meet today's most demanding data plane application requirements.

In 2007, HP (now Hewlett Packard Enterprise) broke with the industry tradition of proprietary server technologies for telecom and led the industry by enabling high-volume, industry-standard servers for telecom central office applications. Hewlett Packard Enterprise adapted its high-volume ProLiant rackmount servers and HPE BladeSystem ecosystem to be NEBS Level 3 and European Telecommunications Standards Institute (ETSI) certified. These high-volume products have been proven to meet the rigors of telecom CO deployments and provide the CSP with the possibility of server infrastructure consistency across all the deployment environments.

HPE Server NFV Infrastructure Lab

To help advance the development of high-performance servers for packet-processing applications, Hewlett Packard Enterprise has created the HPE Server NFV Infrastructure Lab. The lab analyzes and works with a wide range of NFV infrastructure technology, including OSs, NICs, device drivers, DPDK, single root input/output virtualization (SR-IOV), VM hypervisors, and Open vSwitch (OVS) to ensure optimal real-world performance.

Examples of the type of testing the HPE Server NFV Infrastructure Lab conducts include:

- Validates and optimizes the integration of HPE and partner NFV infrastructure technologies
- Ensures the base hardware/software configurations enable the maximum possible packet-processing throughput across OSs, NICs, drivers, DPDK, SR-IOV, and hypervisors
- Interacts with OEM partners and infrastructure vendors to resolve functional and performance issues
- Provides support for selected customer proof of concepts and demos

Planning and patience will pay off

There's widespread agreement that NFV provides Communications Service Providers with a viable strategy for improving on their current competitive and network infrastructure challenges. Although every transformative technology presents new hurdles, careful planning—combined with a thorough understanding of **virtualization technology** best practices—will improve the likelihood of a successful changeover.

Moving forward, take the time to learn as much as possible about specific network virtualization technologies such as NFV servers, supported OSs, NICs, software applications, packet-processing software, and management tools. Study how other CSPs have successfully made the leap to a virtualized environment and learn from their successes and their mistakes. Most importantly, realize that while virtualization may represent uncharted territory, large enterprises have already gone through similar transformations of their IT infrastructure. As the partner of choice in many of these enterprise transformations, Hewlett Packard Enterprise is uniquely positioned at the intersection of IT and telecommunication infrastructure to help transform telco networks with the right balance of cost, risk, and timing.

Learn more at
hpe.com/dsp/infrastructure

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