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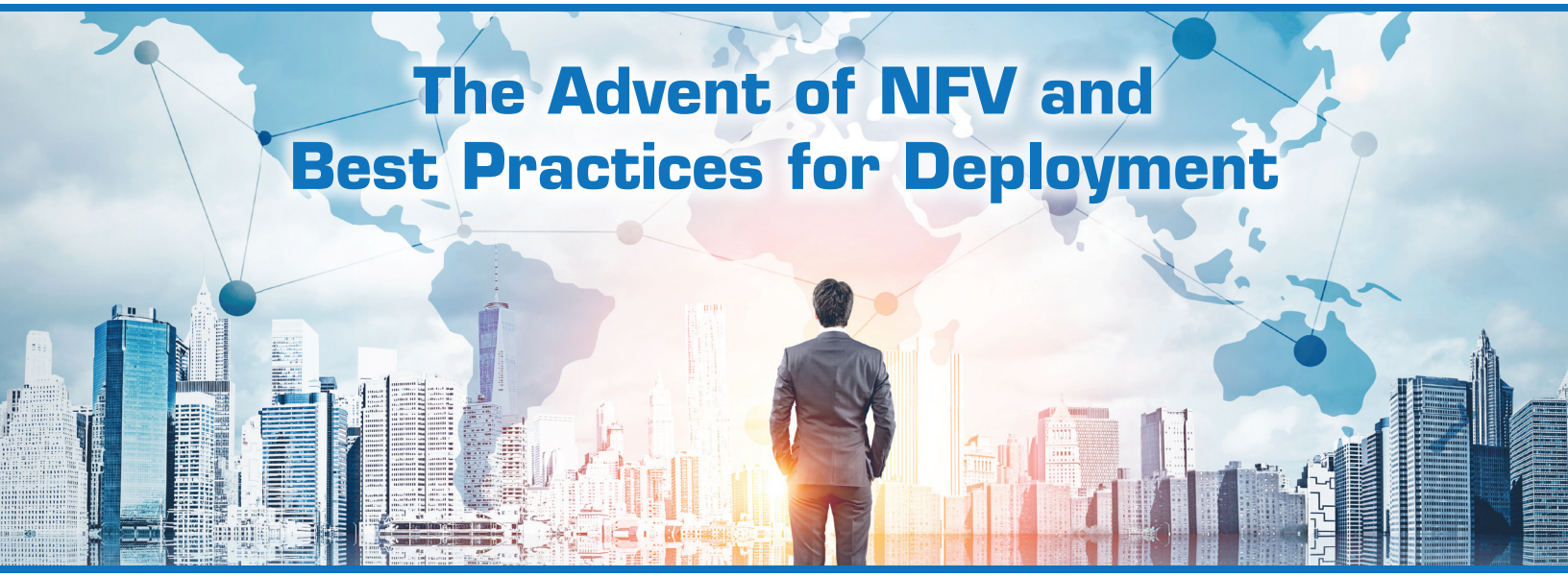
End-to-End Networking Solutions | IT Staff Outsourcing Services | SDN & NFV



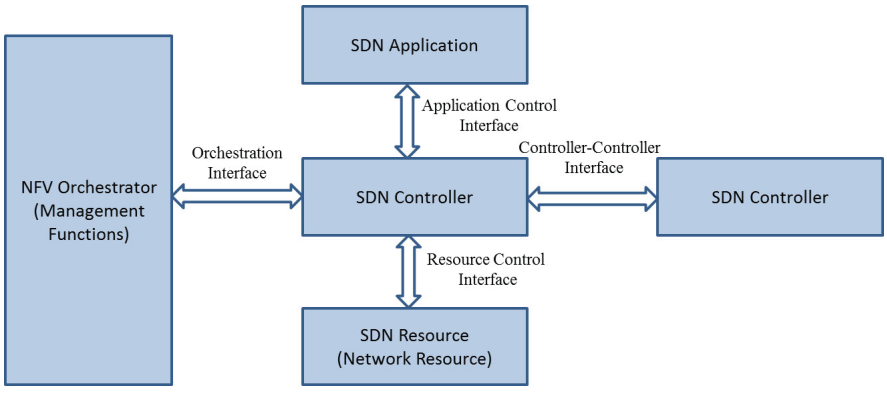
The Advent of NFV and Best Practices for Deployment

Traditional telecom OSS systems are being disrupted due to massive complexity, slow development time and legacy design concepts – the same is true on the enterprise side of the demarcation as well. Enterprises are looking to reduce operational expenditures and increase network agility and flexibility. Network Functions Virtualization (NFV) benefits organizations on multiple levels, offering flexibility and new possibilities for serving the needs of their customers more efficiently while helping them achieve their CapEx and OpEx goals. While NFV has been around (at least conceptually) since 2013, its true benefits are only now becoming realized in real-world applications, which are largely being driven by new network requirements, including uCPE, SD-WAN, IoT, network slicing and 5G.

Before we jump ahead, let's first make a quick distinction between SDN and NFV. NFV and Software Defined Networking (SDN) are often discussed in the same breath as they are two interrelated technologies that often exist together. NFV and SDN are both steps toward network virtualization and automation, but the two technologies are fundamentally different and ultimately serve separate purposes.

SDN is the broader term of separating the control plane from the data plane in a network device. NFV is the act of migrating network applications as routing, load balancing, firewalls, etc. away from dedicated appliances and into a virtualized environment on "white boxes" consisting of x86 or ARM-based devices. The below image from ETSI illustrates how SDN and NFV are complementing (not the same) technologies.

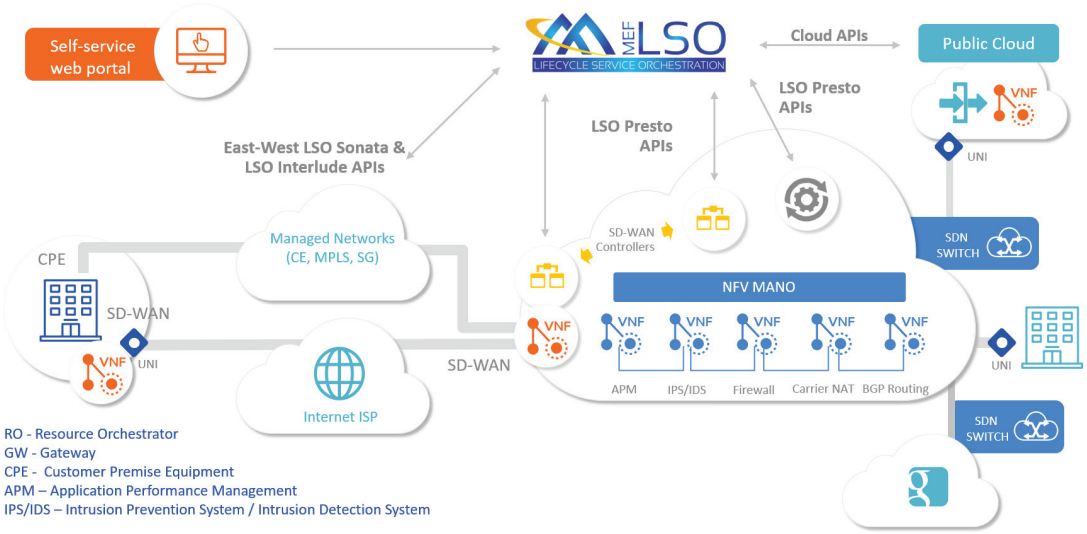
This e-book outlines the key drivers impacting NFV adoption and how to take full advantage of it to increase network agility and time and cost savings as the technology and management moves toward maturation.



ETSI image

Why NFV?

NFV makes network and service provisioning faster, more flexible and cost effective. It enables users to scale services up or down quickly to address network architecture and deployment demands. Delivered as software, those services can be dropped to virtually any server, including critical security gateways. As such, service providers can simply take the function associated with the physical asset and instantiate it as a virtual machine. Moreover, this virtualization eliminates the dependency between a network function and its hardware (control plane vs. data plane as discussed above), providing network operators and service providers virtual presence, virtually anywhere.



MEF image

Reduced Cost of Ownership

Services are modeled using a standards and models-based approach and then instantiated into the virtualized infrastructure. These "virtual devices" then behave as physical network elements without the need for implementation (and administration) of multiple hardware appliances. NFV allows organizations to construct easily adaptable, highly scalable, agile networks that are highly programmable, automated and allow for greater network control - at a fraction of the cost of purchasing specialized network equipment.

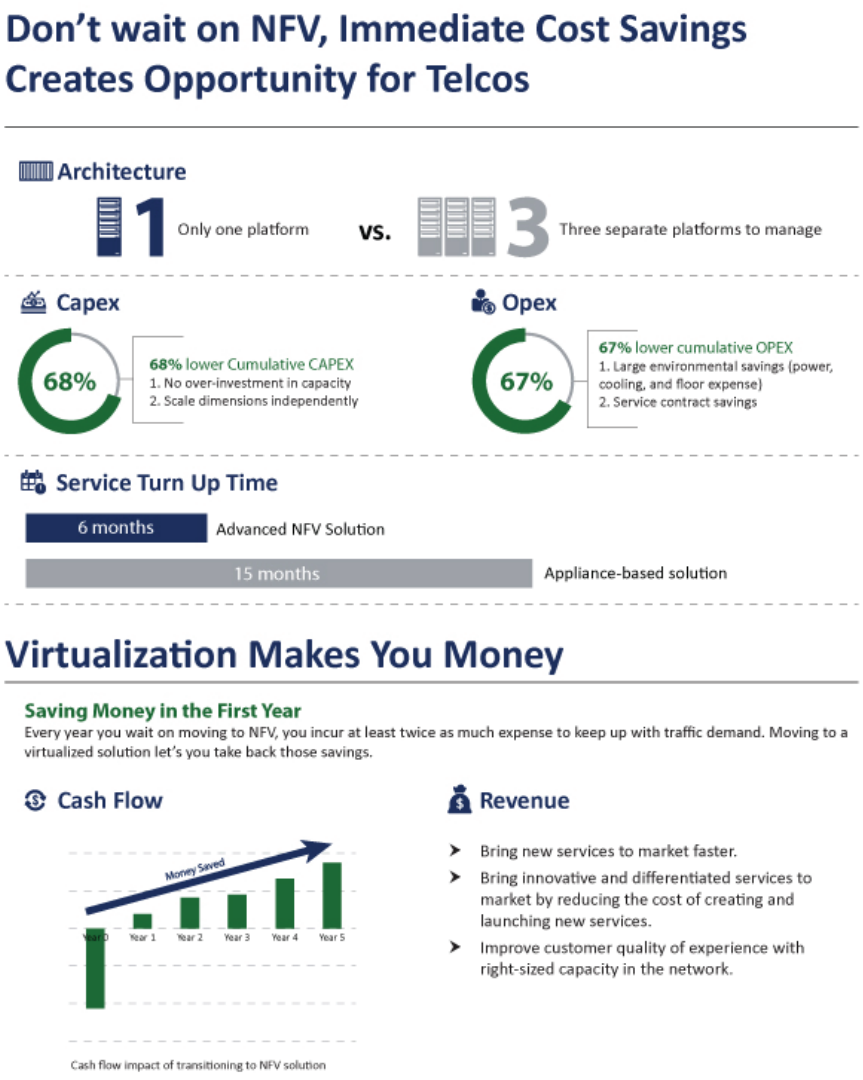
While NFV promises to deliver cost savings and improved efficiency, what is a reasonable expectation? To answer this question, Affirmed Networks Inc. and VMware Inc. teamed with ACG Research to study the financial benefits to operators of NFV. The team created the below infographic to illustrate how network operators can start seeing benefits right away.

But cost savings are only one part of the NFV story, according to many that have undergone the shift. Deutsche Telekom has said that service agility is the primary motivation for its interest in technologies like NFV and SDN. And Vodafone already has developed an MVNO service through the use of virtualization technologies in just a fraction of the time it would normally take.

Scalability / Agility

While the physical devices contain both a control plane and a data plane, underlying resources employ intelligent abstraction to deploy and manage services; i.e the data plane separated from the control plane. This makes the virtual environment more scalable and portable, and ultimately, more cost-efficient.

The automated nature of virtualized networks is ideal for multi-tenant (application) environments, providing resources for more effectively balancing load while managing dynamic traffic. Another important use case for NFV is the branch or remote office, where traditionally, many separate appliances perform the tasks that can now be integrated into an x86 or ARM "white box" platform, and different Virtual Network Functions, or VNFs, can be instantiated on these white boxes.



ACG Research Infographic

Service Delivery

Adopters of NFV technology can also expect significant uptime improvements in their network and time-savings once deployment is complete. NFV's programmability expedites the design, testing, development and deployment of projects. Configurations and services adds/changes that once took months to complete can now be delivered in weeks, or days, allowing carriers to shorten their time to revenue while enterprises are able to dramatically speed up their service delivery as compared to outmoded network services methodologies.

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NFV Management - ONAP & MANO

From its very inception, NFV management has been a priority and there are essentially two competing protocols for NFV management, Linux Foundation's Open Network Automation Platform (ONAP) and The European Telecommunications Standards Institute's (ETSI) Network Functions Virtualization Management and Orchestration (MANO).

ONAP is an open source service automation and orchestration platform created to automate and standardize virtualization projects. Network, cable and cloud providers are leveraging ONAP to realize faster development cycles, more robust operational automation, and faster time to revenue for the service delivery lifecycle.

The closed-loop automation platform builds virtual network functions (VNFs) and software-defined networks (SDN) end-to-end, allowing service providers to implement standards-based lifecycle orchestration and service APIs for new technologies.

While ONAP's architecture is guided by metadata and policy, it is also flexible and able to evolve alongside companies' changing needs. Read more about ONAP in Datavision's ONAP ebook, *ONAP - The Road to Implementation - Successful Integration and Deployment Strategies*.

ONAP's counterpart from the European Telecommunications Standards Institute Industry Specification Group (ETSI ISG), has also picked up support from key industry players, namely European carriers such as BT and Telefonica. It is the ETSI-defined framework for the management and orchestration of all resources in the cloud data center. This includes computing, networking, storage, and virtual machine (VM) resources.

For the NFV MANO architecture to work properly and effectively, it must be integrated with open application program interfaces (APIs) in the existing systems. The MANO layer works with templates for standard VNFs, and gives users the power to pick and choose from existing NFVI resources to deploy their platform or element.

Common Challenges

In a TechTarget article, Lee Doyle, Principal Analyst at Doyle Research notes that implementation of open source for NFV applications will require service providers to adopt new ways of designing, deploying and supporting their network infrastructure. Network infrastructure based on open source software represents a radical shift from the traditional model of relying on large network equipment suppliers -- e.g., Ericsson, Nokia, Cisco or Huawei -- to design, test, deploy and support highly reliable networks. Doyle notes the following as key questions regarding NFV:

- **Who will contribute the leading-edge code? Will it be network suppliers, ISVs, service providers or standards organizations?**
- **Who will govern standardization and stabilize the open source code? How will standards and interoperability be maintained?**
- **Who will test the code and make sure rigorous security is maintained?**

Doyle adds that for service providers, open source is a new engineering practice, and they will need a new open source culture. Open source requires new disciplines, respect and credibility; service providers can no longer just demand that suppliers build unique new features useful only to them. Service providers will need to form key partnerships to develop the software, test it, and provide integration and support.

NFV is proving complex and difficult for many operators to deploy at scale. The breadth of the architecture and the number of distinct components make it challenging to design, build and support. NFV must be integrated into existing network architectures and linked to operations systems. Lack of mature standards and "blueprints" for NFV implementations will hinder deployments. But there are options.

NFV Deployment Best Practices - Partnering for Success

Successful NFV Deployment Starts with Analysis and the Use Cases

Assessment And ROI Analysis

With SDN/NFV Now Lifecycle Management, we start by identifying all use cases that present a valid reason to apply SDN and NFV to your existing infrastructure.

Once the Use Cases are identified, the next step is designing a network solution architecture that addresses each relevant use case.

Design and Architect

Datavision helps create, design and architect SDN/NFV configured for your unique network requirements using industry best practices developed by our experienced networking team.

Software functionality also controls the SDN/NFV network, regardless of software vendor, further enabling automation of the network. Applications interact with the network through open APIs, eliminating the need for developers to write support for proprietary hardware and software.

Is NFV right for you? Have you asked...

- Is it becoming difficult to meet user demands within my current networking infrastructure?
- Is my team losing productivity because it spends too much time coding traditional network elements in the CLI when changes need to be made?
- How do I meet the directive from company leadership to reduce operational expenses related to maintaining my network?
- How do I handle the speed, volume and application demands being placed on my network?
- How can I make my network more agile?

Quick Start Lab

A Proof-of-Concept (POC) is developed to prove out the technology and methodically introduce it into the network. With Datavision's QuickStart Lab, you're able to optimize your deployment by running it in your own testing and development environment before implementing it in your network. We help you design a Proof-of-Concept (PoC) with a well-defined set of key performance indicators. Our SDN/NFV QuickStart Lab allows you to identify and test the KPIs of your project, proving out the benefits of increased uptime, improved network agility and less manual intervention in the real-life simulations before you even deploy.

Datavision Ensures A Smooth Transition From Proof-of-Concept To Realization: Your SDN/NFV Roadmap

Datavision's SDN/NFV Realization Roadmap ensures you experience a smooth transition from Proof-of-Concept (PoC) to realization with our expertise in full-cycle SDN/NFV implementation.

Datavision guides you through establishing a virtualization strategy for your organization, including a review of services, geographies and vendors. We create a detailed PoC plan, which allows you to "test drive" capabilities for your specific network needs, and ensures that it meets your requirements and success benchmarks before rolling it out to the rest of the network.

The PoC stage is critical for the deployment of any new network technology. The PoC is based on an identified use case that is highly controllable and has few moving parts. Datavision's QuickStart lab gives you a test environment that makes it quick and efficient to test your proposed SDN in a real-file simulation. The PoC is executed quickly with the key objective to test and verify the concept that open standards and a models-based approach reduce the need for additional customization.

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Our Realization Roadmap guides you through the process of SDN/NFV implementation, guaranteeing every detail and potential issue is addressed so you can expect a successful deployment.

Operational processes to manage the network from day-to-day are also defined. We assess SDN/NFV implementation based on your network dependencies and what process change requirements are needed to implement the software-defined network moving forward.

Migration Planning

Implementation is an ongoing process, requiring a determination of how to integrate the technology while still leveraging your existing network investment. It isn't like setting up a new department where you're just adding onto your existing network. With SDN/NFV, you're looking at a new view of how the network operates.

Datavision works with you to create a migration plan that allows you to seamlessly integrate SDN/NFV technologies without disrupting your existing network.

Due to the increasing rate at which new products and technologies are being introduced in the field, companies like Datavision can also add much to the evaluation and vetting process of all the vendors by providing expertise, benchmarking and resources as you migrate to a virtualized infrastructure.

Deployment And Realization

As with any infrastructure upgrade, the deployment of SDN/NFV requires a detailed implementation plan with a timeline for specific phases of the deployment. The timeline should allow for the development of any new software applications in advance and plan for configuration and optimization of these applications once SDN/NFV is deployed.

We ensure that we maintain clear and open communication throughout the project, and that coordination between the development and production environments is established and rigorously maintained.

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Optimization

Cost reductions vary across businesses, but the first goal should be to capture measurable savings on operational and infrastructure costs. Optimization of virtualized appliances is the key in lowering CapEx and OpEx.

Datavision helps establish a clear set of metrics to measure cost savings. Ongoing measurement and analysis of these metrics helps guide the ongoing network optimization process.

The high level and comparative ease of programmability of an SDN/NFV infrastructure leads to a lower network operating cost. Dozens of man-hours previously spent on hand-coding hardware are eliminated and the increased speed of an SDN-enabled network allows for new network services to be launched quicker, which could speed up revenue streams.

Whether supplementing an existing IT team or providing full end-to-end solutions, Datavision has the resources to be a valuable partner in keeping SDN optimized and helping you realize lower CapEx and OpEx.

About Datavision

Datavision is a full-service information technology firm specializing in networking solutions for software-defined networking (SDN), network functions virtualization (NFV), edge computing, 5G, data center, network security and other next-gen technologies. Datavision's team of network engineers and consultants partner with the world's top technology providers and open source automation projects, such as ONAP, to create the optimal solution to help move your company forward.

Contact us now to learn more about our NFV solutions.

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