



# Operations under NVF & SDN

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*Jason W. Rupe, Ph.D*

## What are NVF and SDN?

NVF (Network Function Virtualization) is where telecommunications service providers leveraged IT concepts to move network capabilities into Cloud and data centers to help them be more agile. The advantage is to better leverage longer lifetimes in hardware by decoupling their specific function from the hardware, allowing software to be updated and hardware to be reused for multiple, new purposes.

SDN (Software Defined Networking) is about separating the data plane from the control plane in a standard way. It was born out of the needs of the campus network, and found to work well for data centers. Now SDN expands to other areas, and takes an IT centric approach.

While complimentary, they are different efforts that have their own benefits. But both are a decoupling of constraints, allowing for smaller changes to the overall system to be accomplished with lower cost per unit of time, and therefore carry the potential to lower total ownership cost.

## Technology Replacement

The intent of NFV and SDN developments is to decouple. By separating the data from the control planes, you can make changes to one and not the other, whereas traditionally a need for the change in one forced a change in both, leading to more replacement, and therefore higher costs. Similarly, by separating the hardware from the software, software changes can be made that do not necessarily require replacing of hardware, and vice versa. In NVF, providers can potentially change software vendors without a hardware change, or even share hardware. Now software and hardware replacement cycles can be driven by their separate functional needs, not forcing a joint replacement.

Thus, technology replacement is a new game. Rather than buy platforms, and often an associated new architecture, the problem to be addressed is different. There will be more focus on software, and on ensuring that it fits your hardware and meets your performance and service needs as well. On a separate cycle, hardware advancements will be assessed to support an overall software strategy which will be scalable. The advantages of this decoupling have a cost as well, however. Where the platform you once purchased came with hardware suited to the software, with guidelines for appropriate provisioning to support your needs, you now must make sure the hardware platform can be managed to the VM needed to support the software.

Technology replacement on the surface appears to be simpler, but only if the business is ready for a disciplined, effective mix of planning and engineering, and a very mature capacity management. Decoupling allows greater efficiencies, but only if your organization is sufficiently capable to take advantage of these degrees of freedom.

## Planning and Engineering

If your operations are constrained by space and power, and if processes are constrained by the cycle times to relieve real estate constraints, then planning, engineering, and deployment times will be relieved to a degree. But planning and engineering will be different for effected systems.

There will be differences in the traffic as a result of the change to NFV or SDN or both, but the new capabilities from these technologies will help planning and engineering cope with that change. However, the larger impact will be due to the decoupled resources. Having the ability to deploy hardware nearer to the core of the network affords better management of space and power constraints. Also, the ability to reuse hardware under different software configurations means fewer forklift upgrades, and more software change management, arguably an easier problem to manage.

But as services are further enabled, demand will change, so a provider must continue to plan against a moving target, perhaps one that is moving faster now.

Fortunately, if leveraged properly, SDN has the potential to help you manage services better. If made effective and implemented well, it may compliment the rapidly moving service demand.



## Capacity Management

But will the capacity management (CM) tools be adjustable to the new problem? Unless the organization has made the shift, successfully, to application performance monitoring (APM), and taken that practice to the next level of management, there is no way to manage that resource capacity. While some virtual infrastructures may be able to automatically manage the software to a degree, letting go of that control may drive costs to be unmanageable. But with a disciplined approach this is a solvable problem.

It is important to be aware that, by decoupling the data plane from the control plane, their capacities and effectiveness now must be separately managed. Likewise, the decoupling will drive the need to separately manage hardware and software resources. Now CM and APM must be done in concert.

## Maintenance

Decoupling hardware from software might simplify maintenance, and should reduce the maintenance urgency when the resources can be somewhat self-managing. However, there may be significant outages in the Cloud implementations, affecting all or many services at once. Therefore, risk has changed in this model. So far, the availability numbers for Cloud and virtual functions is far from carrier

grade, and not sufficiently dependable for many legacy services. Hopefully that will improve as we discover how to better manage these architectures.

## Provisioning

The intent of these technologies is to simplify this part of operations, and automate some of it, thereby greatly reducing the manual work required. However, there will likely be hidden complexity, making failed provisioning a more frequent problem, at least at first. Further, complex services will become in demand, making an understanding of the underlying layers of the SDN architecture, especially that of the controller, much more important.

## Conclusion

The intent of NFV and SDN, by decoupling constraints to networking and IT, is to simplify operations, reduce costs, and speed up access. Implement these technologies requires a maturity that some organizations are not ready to take on. Those organizations will have to abandon current hands on roles and relinquish control to those who succeed in implementing NFV and SDN; are more disciplined in planning, engineering and capacity management; and, have figured out how to do both virtualization approaches well.

The Government will need to spread its risk by partnering with multiple providers, and forcing them to work together. Long, significant outages from one provider must be offset by effective service provided by another. However, capabilities have to be provided by both, and perhaps flow between the networks and systems. Interworking will therefore be necessary.

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