

E-Guide

# SDN ESSENTIALS: TOP CONSIDERATIONS





SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology



**HE GOAL OF** SDN is dynamic networks, so it's crucial to understand the concepts of network orchestration and virtualization. This expert E-Guide explores network

orchestration and network virtualization. Additionally, uncover the top network virtualization considerations for a hybrid environment.



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology

## SDN ESSENTIALS: WHY NETWORK ORCHESTRATION AND VIRTUALIZATION?

One of the key goals of SDN is to implement flexible networks that can be dynamically provisioned. While the main cornerstones of SDN are centralized control and network programmability, network virtualization and network orchestration are just as important.

## WHY NETWORK ORCHESTRATION?

With SDN, the network can be provisioned in an orchestrated way along with other IT components like servers, storage and applications. The big concept is that a software-defined network can be automated. Automation allows services to be provisioned quickly and at scale with reduced chance for human error.

SDN orchestration tools have emerged from startup Anuta Networks and Alcatel-Lucent's Nuage Networks. These tools target cloud providers that need to automate the creation of network services for their customers, although each company attacks the problem in a different way. Anuta's solution focuses on working with the network infrastructure many providers already have in place,



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology while Nuage introduces a distributed software router and overlay network to create multi-tenant friendly network containers.

While the needs of a cloud provider might seem distinct from that of an enterprise network, the fact is that enterprise networks face the same complex application deployment challenges that cloud providers do. While full SDN orchestration solutions for the enterprise haven't appeared yet, it's worth noting that as network vendors produce controllers, they highlight their partnerships with other vendors. The trend is for controllers to interoperate with a wide variety of network vendor equipment, including application delivery controllers. The long view is that fully automated network provisioning that integrates with broader IT orchestration will be a normal function for all networks, no matter what type of organization they serve.

## WHY NETWORK VIRTUALIZATION?

Much of the technology discussed so far leads to the implied goal of network virtualization. When a network is virtualized, the physical components of the network have been abstracted so users no longer have to think of the network in terms of specific routers, switches or even ports. Instead, a common physical network is shared by a variety of virtual networks. While hardly a new idea, a



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology rudimentary example of this is 802.1Q virtual LANs paired with Q-in-Q tunneling. MPLS is another tried-and-true technology that has been used to achieve this sort of network virtualization. Despite being a well-known and mature technology, Q-in-Q and MPLS tend to be service provider technologies, and they are not often deployed in data center environments.

In SDN paradigms, network virtualization tends to be accomplished using overlays like Virtual Extensible LAN (VXLAN), Network Virtualization using GRE (NVGRE) and Stateless Transport Tunneling (STT), possibly in conjunction with OpenFlow. In an overlay network, traffic that is part of a particular virtual network has an identifying wrapper placed around it that isolates it from other virtual networks sharing the same underlying physical network. While not strictly required, an SDN controller can be used to identify all of a virtual network's endpoints, instructing switches where and how to encapsulate traffic inside of the overlay, maximizing the efficiency of endpoint-to-endpoint communication.

While an overlay is more of a cloud provider tool at this time, it could find its way into enterprises that are weary of building out separate physical environments for their lines of business or environments but don't want to support the complexity of virtual route and forwarding (VRF) or MPLS. Overlays are a



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology potential way to securely provide logically separated virtual networks on the same physical infrastructure. Coupled with an SDN controller, deploying and maintaining such virtual networks could be an easily manageable task.

Often lumped into the network virtualization discussion are those vendors that have virtualized their appliances to run on a hypervisor. Strictly speaking, a virtual firewall or application delivery controller is not the same as SDN, although these virtualized network components could well play into an SDN infrastructure. Be careful not to let a vendor with a virtual appliance (and nothing more) claim it is selling SDN. While dovetailing nicely with SDN, what virtual appliance vendors are providing is more accurately described as network functions virtualization (NFV); NFV standards work is being done inside of ETSI for those wishing to follow this phenomenon more closely.

Any business seriously evaluating SDN should keep in mind that the technology is an evolving one. SDN is not mature, and it lacks standards or even a definitive reference model and means different things to different vendors. This has caused market confusion that has grown in lockstep with the buzz around it. At least partially in reaction to this, the OpenDaylight project (ODL) hosted by the Linux Foundation was formed by a consortium of SDN vendors to homogenize the SDN marketplace a bit. I believe ODL is a project to watch



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology because it covers the entirety of the SDN stack, including network applications, orchestration, a controller, northbound APIs and a southbound abstraction layer. As ODL matures and the codebase begins to settle, it could well represent a common baseline for all SDN solutions.

**ETHAN BANKS**, CCIE #20655, is a hands-on networking practitioner who has designed, built and maintained networks for higher education, state government, financial institutions and technology corporations. Banks has also been a host of the Packet Pushers Podcast, a technical program that covers practical network design, as well as cutting edge topics like virtualization, OpenFlow, software-defined networking and overlay protocols. He is the editor for the independent community of bloggers at PacketPushers.net and can be followed @ecbanks.



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology

## WHAT TO CONSIDER FOR HYBRID NETWORK VIRTUALIZATION TECHNOLOGY

Ethan Banks

While SDN may eventually alter the way we architect networks, it is possible in the short term to implement network virtualization technology in a hybrid environment in which traditional and virtual technologies complement each other.

In some cases, enterprises can use hybrid switches, which will forward traffic both traditionally and using SDN instructions. It's important to remember that not all OpenFlow-capable switches also run traditional protocols; therefore, organizations must specifically inquire about switches' hybrid capabilities during their evaluation.

Another hybrid approach is to install a "greenfield patch" in the brownfield data center. Here, users build a new network segment supporting virtualization and bridge it back to the legacy infrastructure. As the greenfield virtualized segment is proven, the lessons and techniques learned could then be applied to the legacy infrastructure.



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology As mentioned earlier, overlay networks can be transported on top of the existing physical network, or underlay. Overlays are viewed by some as a transition mechanism to pure SDN. Whether overlays are transitional or here to stay, the fact that they are seen by the network as simply IP traffic means that organizations can introduce overlays to their legacy network with little difficulty today. In fact, several vendors count on the relative ease of overlay integration as a selling point for their network virtualization products.

Much of network virtualization is achieved in software, so it doesn't have to be costly to experiment. In fact, there is a variety of open source software that makes it possible for companies to try out network virtualization with nominal financial investment. Open vSwitch (OVS), an open source virtual switch with a rich set of capabilities has become quite popular. Coupled with OpenStack and the Neutron plug-in for OVS, it is possible to build virtual networks running "as a service" inside a larger cloud.

Moving to network virtualization is as much a mental and operational shift as it is a shift in networking itself. For years, network upgrades have been incremental, with little overall bearing on an organization's IT process, but network virtualization is a fundamental change. The long-term benefits for an organization include a tight integration of IT operations as network consumption is



SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology absorbed into the rapid provisioning processes already enjoyed by server and storage teams.

Clearly, the notion of network virtualization is here to stay; it's an idea that has many proponents, and the number of products in the space is growing. The challenge for IT teams is in evaluating the diversity of approaches in the context of specific business needs and taking into consideration rapid technological developments.

## > SearchSDN

Home

SDN Essentials: Why network orchestration and virtualization?

What to consider for hybrid network virtualization technology



## FREE RESOURCES FOR TECHNOLOGY PROFESSIONALS

TechTarget publishes targeted technology media that address your need for information and resources for researching products, developing strategy and making cost-effective purchase decisions. Our network of technology-specific Web sites gives you access to industry experts, independent content and analysis and the Web's largest library of vendor-provided white papers, webcasts, podcasts, videos, virtual trade shows, research

reports and more —drawing on the rich R&D resources of technology providers to address market trends, challenges and solutions. Our live events and virtual seminars give you access to vendor neutral, expert commentary and advice on the issues and challenges you face daily. Our social community IT Knowledge Exchange allows you to share real world information in real time with peers and experts.

## WHAT MAKES TECHTARGET UNIQUE?

TechTarget is squarely focused on the enterprise IT space. Our team of editors and network of industry experts provide the richest, most relevant content to IT professionals and management. We leverage the immediacy of the Web, the networking and face-to-face opportunities of events and virtual events, and the ability to interact with peers—all to create compelling and actionable information for enterprise IT professionals across all industries and markets.