Overlays for Data Center Networking: Drivers & Challenges

EXECUTIVE SUMMARY

Virtualization has long been common within the server domains of data centers, and is increasingly so in the storage domain. Only recently, however, have operators considered virtualizing in the network domain. Networking is a complex endeavor, and tools such as OpenStack are generally perceived to lack some of the functionality required for highly available, highly scalable networks.

Overlays have been proposed as a way to provide the connectivity needed to support the networking needs within the data center. They abstract the details of the physical network, making it much faster to connect virtual machines (VMs) and other devices. Rather than provision paths on physical devices, overlays encapsulate traffic using protocols such as VXLAN and NVGRE to tunnel across the physical network. These newer protocols allow operators to move beyond the limitations of VLANs, which only support 4,096 virtual networks, so they can better support multi-tenant cloud services.

Another driver, which is not as clearly understood, is the emergence of network functions virtualization (NFV). In NFV, functions that had previously resided on purpose-built, proprietary platforms will be supported on general-purpose servers in the form of virtualized network functions (VNFs). How these workloads will behave in terms of elasticity and mobility is still be determined, but overlays are seen as an effective approach to providing the flexibility they will need to manage VNFs. Overlay networks also make it easier to move workloads between and across data centers. By mapping VXLAN to MPLS paths, virtual private networks can be extended beyond the data center across the WAN.

Despite these potential benefits, overlays are often seen as introducing more complexity into the data center environment. Opinions vary as to how significant this issue is: Some argue that in the end, operational expense will decline, because less time will be spent managing the physical network; others contend that managing service performance will become more complicated from having two domains to consider. Even when overlays are present, the physical network will remain critical for ensuring service quality. Discussions with operators suggest that the benefits will ultimately outweigh these concerns, although it will take time for operations to get comfortable with the new approach.

Overlays for data center networking: drivers and challenges highlights and analyzes the potential impact overlay networking will have on the telco data center networking domain, including the various drivers that support its deployment. It also provides analysis of some of the main challenges that overlay networking can introduce into the environment.

The report also profiles 10 leading overlay networking solution suppliers, including the details of their approaches, components of their solutions and partnerships.

As shown in the excerpt below, overlay networking describes the creation of a virtual network that runs on top of a Layer 2 or Layer 3 physical network. Most often, overlays are used to connect VMs to each other. They are also used to connect VMs to gateways to the physical network including bare metal. Tunnels are used to transport payloads across an underlay (physical) network that has no visibility into or awareness of the traffic in those tunnels. Overlays are an attractive option to data center operators because they reduce the need for frequent modifications to the physical network while providing more agile deployment of networking resources.

Figure 1: Virtual Overlay Network
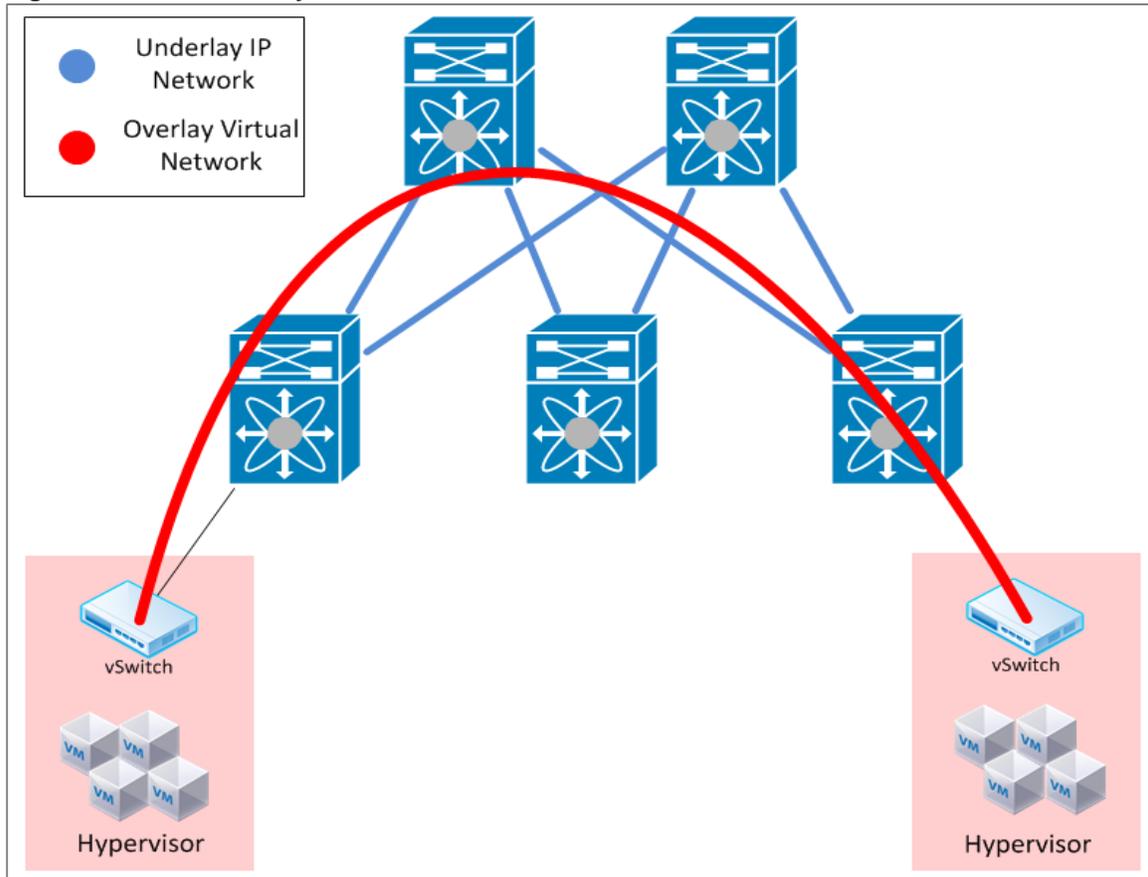
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Report Scope & Structure

Overlays for Data Center Networking: Drivers & Challenges is structured as follows:

Section I is an introduction to the report, including the key findings of our research.

Section II describes the main drivers behind demand for overlay networking.

Section III provides a look at the main challenges that must be addressed when considering deploying overlay networks.

Section IV provides a comparison of the main suppliers of overlay networking solutions.

Section V provides brief descriptions of the main suppliers of overlay networking solutions.

Overlays for Data Center Networking: Drivers & Challenges is published in PDF format.

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OVERLAY NETWORKING SOLUTION SUPPLIERS (10)

Akanda Inc. / www.akanda.io

Cisco Systems Inc. (Nasdaq: CSCO) / www.cisco.com

CPlane Networks Inc. / www.cplanenetworks.com

Hewlett-Packard Co. (NYSE: HPQ) / www.hp.com

Huawei Technologies Co. Ltd. / www.huawei.com

Juniper Networks Inc. (Nasdaq: JNPR) / www.juniper.net

Midokura Inc. / www.midokura.com

Nuage Networks (Alcatel-Lucent) / www.nuagenetworks.net

PLUMgrid Inc. / www.plumgrid.com

VMware Inc. (NYSE: VMW) / www.vmware.com