INTELLIGENT FABRIC DELIVERS APPLICATION VISIBILITY AND CONTROL FOR NETWORK OVERLAYS

APPLICATION NOTE

Alcatel-Lucent Enterprise
EXECUTIVE SUMMARY

The adoption of cloud computing is spreading across public and private networks in an effort to get the best possible benefit from shared resources such as servers, storage or networks that are used by multiple users in a dynamic fashion.

Server virtualization has increased requirements on the physical infrastructure to support the rapidly growing amount of virtual machines that operate dynamically and on demand while requiring isolation, segmentation and multitenancy.

Virtualized data centers benefit from cloud-like operations to provide seamless workload mobility as a key aspect to ensure business continuity and improved end-user experience.

Server virtualization has improved resource utilization but enables the ability to move virtual machines (VMs) among data center servers dynamically without impacting user functionality or availability. However to accomplish the base requirement is VMs must always remain in their native IP subnet. Unfortunately, IP subetting limits the VM mobility domain to the cluster servers who are on identical subnets.

At the same time cloud services are requiring increased network flexibility and agility to support a dynamic multitenant infrastructure. In addition, the network must support the rapidly growing amount of devices to deliver departmental segmentation, business unit isolation and transparent subnet extensions over existing enterprise networks. The traditional 4096 virtual networks supported by IEEE 802.1Q are just not sufficient.

In response to these needs, standards bodies have defined different overlay solutions that virtualize the layer-2 networks encapsulated over IP to carry the tenant traffic transparently over the physical infrastructure, while decoupling the core from the access and the access from the core.

The Alcatel-Lucent Enterprise Intelligent Fabric technology is a framework architecture that automates and simplifies the design, deployment and maintenance of elastic standard-based networks. The Intelligent Fabric technology provides overlay network visibility and control including capabilities to seamlessly integrate overlay technologies with legacy technologies in its architecture.
Overlay technologies
Overlay network technology addresses these challenges and provides immense business agility and scale. It provides business agility by helping IT to seamlessly deploy virtual machines on any virtualized host regardless of the data centers subnetting scheme. This way, the connectivity within the domain can expand beyond hosts and data center boundaries, over reliable IP infrastructure. Several technologies have emerged for this purpose: virtual extensible local area network (VXLAN), network virtualization using generic routing encapsulation (NVGRE) and stateless transport tunneling (STT).

VXLAN, as an overlay technology, removes the need for each virtual resource to be learnt by the network, and it isolates the network from the higher-level forwarding decisions. It provides for scalable multitenant networks that run on top of IP, supporting up to 16 million virtual networks. In essence, it provides for massively scalable virtual networks that operate as long as the underlying IP connectivity is intact.

Even today, after a decade of evolution of server virtualization, a good percentage of hosts still remain non-virtualized, either because of the need to support legacy applications or because of the lack of incentive to change. This demands the need for the network infrastructure to support the VXLAN gateway functionality that helps virtualized workloads operating in an overlay network environment to communicate with non-virtualized workloads, that is, appliances that connect to traditional virtual LAN (VLAN) based networks.

Solution and use cases
The Alcatel-Lucent OmniSwitch® 6900-Q32 and 6900-X72 platforms support VXLAN gateway capabilities, also referred to as virtual tunnel endpoint (VTEP), enabling a full hardware-based high-performance solution.

The Intelligent Fabric technology enables the virtual machine (VM) snooping capability on the OmniSwitch family, which allows for improved service delivery of overlay networks when transported over the underlying network. The OmniSwitch platform supports visibility and control of virtual tenants identified by the virtual tenant network ID (VNID), providing visibility into individual applications, as well as the capability to apply quality-of-service (QoS) offering differentiated services.

In greenfield data centers where all workloads are virtualized and running as VMs, the individual virtualized hosts provide virtual network creation and binding of workloads to them. For transport, you need an IP infrastructure that not only provides connectivity, but improves business agility by enabling automation through self-configuration and by being programmable through OPEN interfaces as well as application intelligent so that it can provide differentiated services.
Most of today’s data centers have mixed workloads, some virtualized and some non-virtualized. The OmniSwitch 6900-Q32 and 6900-X72 platforms are an ideal choice in this environment, because they enable high performance data centers that connect virtual overlay networks to both traditional physical servers and appliances (such as load balancers and firewalls) acting as the tunnel endpoint on switch interfaces where needed.

Intelligent Fabric simplifies provisioning and enhances service delivery:

- Capable of dynamic learning of virtual applications inside each VNID
- Automatic Discovery of remote VTEPs (in multicast environments)
- Service model architecture provides a flexible scheme to assign traffic to each VNID
- User network profiles can be used to map devices to specific VNIDs, create VNID on demand, as well as enforce QoS policies based on VNID
- A full suite of routing protocols and capabilities for routing VXLAN frames between VTEPs
- RESTful interfaces to integrate the OmniSwitch VXLAN gateway into any software-defined networking (SDN) or orchestrated virtualized ecosystem
Network overlay technologies enable the data center network to transform to a virtualized multitenant network over a shared IP infrastructure that can be consumed for service delivery, enabling flexibility and rapid provisioning. IT can now design and deploy more scalable solutions, going from 4096 virtual networks to 16 million, while allowing applications to seamlessly connect from anywhere with anyone. Alcatel-Lucent Enterprise Intelligent Fabric provides a cost-effective solution where services can be added, moved and expanded without the need for manual configuration of the underlying network infrastructure.

To get more details on these and other advanced capabilities on the OmniSwitch platform, visit enterprise.alcatel-lucent.com