The Kaloom™ Virtual Gateway

Overview

Kaloom's Virtual Gateway (vGW) is a key offering among the integrated and virtual network functions provided by the Software Defined Fabric™. It uses Kaloom's virtual router (vRouter)[1] to currently offer Virtual eXtensible Local Area Network (VxLAN) gateway functionality by extending/bridging a layer-2 (L2) domain to remote L2 domains via a logically created overlay network that runs on top of an IP Layer-3 (L3) underlay network. Kaloom's VxLAN implementation is highly scalable and enables the creation of millions of virtual L2 sub-networks/segments identified by VxLAN Network Identifiers (VNIs) that span physical L3 networks.

As an overlay technology, generic VxLAN implementations allow L2 connections to be extended over an intervening L3 network by encapsulating (tunneling) Ethernet frames in a VxLAN packet format that includes IP addresses. Kaloom's implementation uses the proprietary and inherently highly scalable Kaloom Normalized Format (KNF) for L3 encapsulation to transport packets in the Software Defined Fabric. It enables full L2 network isolation and acts as a gateway for those networks enabling them to be extended outside of a vfabric (i.e., connecting to another external fabric that uses VxLAN as its overlay mechanism). As well, the VxLAN functionality is interoperable with Kaloom's virtual switch (KVS)[2] which connects to a vfabric and which can then attach containers or VMs residing on servers to networks within the vfabric.

In general, devices (i.e., end hosts, network switches or routers) that support VxLANs have virtual tunnel endpoint (VTEP) capabilities. VTEPs encapsulate VxLAN traffic by adding extra headers/fields to the original Ethernet frame using a specific format, and then de-encapsulate that traffic after it leaves the VxLAN tunnel. Implemented in the Software Defined Fabric, the VTEP(s) is created in the vfabric and is hosted on an L3 node which may have multiple attachments to different L2 subnetworks. A unique advantage of the Software Defined Fabric is that it supports a distributed VTEP implementation, whereby only a single VTEP can connect to multiple ports residing on different leaf switches associated to one or many overlay domains.

Figure 1 provides a conceptual and high-level architectural overview illustrating Kaloom's vRouter as an integral and embedded component of the Software Defined Fabric and the VxLAN gateway functionality that it enables. The illustration highlights a logical VxLAN tunnel established between two separate L2 networks domains, whereby a web server in one domain that is physically connected to a leaf switch is trying to call a database that is physically connected to another leaf switch in another domain. The Software Defined Fabric serves as the underlay network which transports the VTEP traffic.

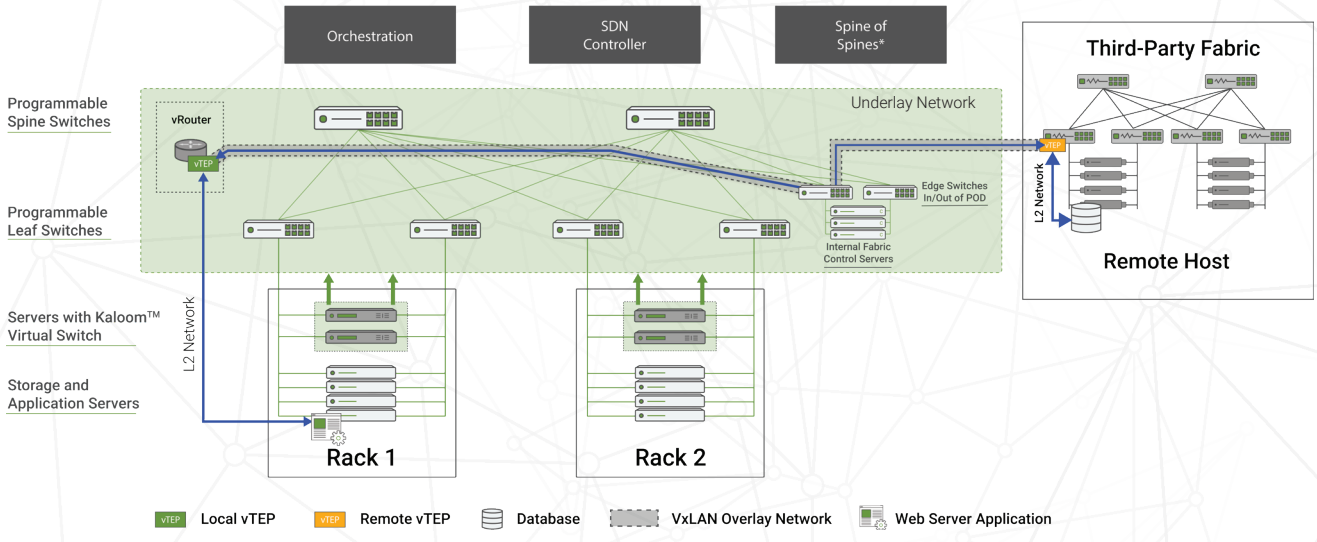

Figure 1: Kaloom Virtual Gateway Embedded in the Software Defined Fabric™

[1] For more information on Kaloom's vRouter offering, please refer to https://www.kaloom.com/product-collateral.
[2] For more information on Kaloom's virtual switch (KVS), please refer to https://www.kaloom.com/product-collateral.

Figure 2 provides an example of a fully configured VxLAN network with assigned VTEPs as seen in the Kaloom Fabric Manager GUI of an actual fabric topology of a vDCO managed vfabric. As highlighted by some key focal areas, the implementation of the vRouter in this scenario is to enable the engineering of traffic path flows between the L2 networks by way of a logical VxLAN network established.

Table 1 below provides a listing of the Kaloom virtual gateway benefit (VxLAN functionality) offered as part of the Software Defined Fabric.

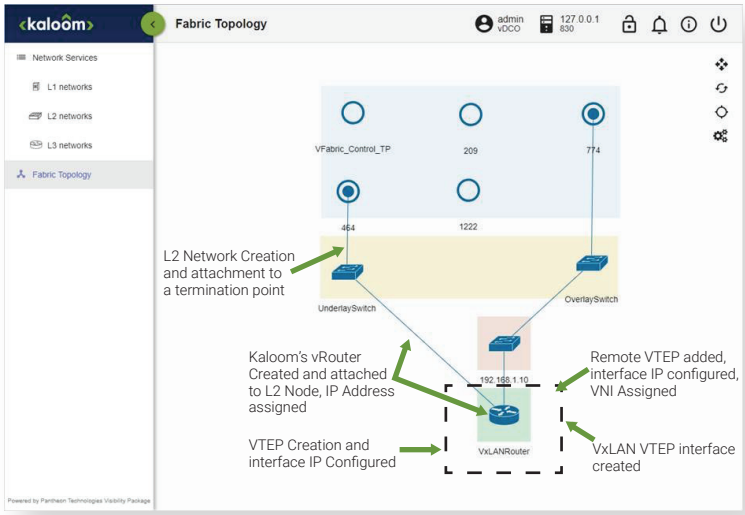

Figure 2: Fabric Topology with VxLAN VTEP

Feature	Benefits
VxLAN Gateway functionality of the Virtual Gateway	› Enables multi-tenancy • Allows customer traffic to be separated over the shared underlay fabric. › Expands VLAN namespace of the Software Defined Fabric to support more VLANs. • VxLANs provide a larger addressing space via its use of 24 bits as compared to the 12 bits for VLANs; enabling 16,777,216 addresses for VxLAN versus the more limited 4096 for VLAN which may not be enough for large computing environments. • Enables more logical network isolation for larger networks (i.e., data centers that typically include many virtual machines or containers). › Enables connectivity of L2 domains over a L3 network • Enables the dynamic allocation of resources within or between data centers without being constrained by L2 boundaries or being forced to create large geographically stretched L2 domains. • Circumvents the need to use Spanning Tree Protocol (STP) to converge the topology in favor of more robust routing protocols in the L3 network instead. STP usage avoidance ensures none of the links are blocked, hence leading to maximum usage and value of each port purchased. • Using the Software Defined Fabric's underlying routing to connect L2 domains allows traffic to be load balanced via Equal Cost Multi Pathing (ECMP) mechanisms thereby ensuring efficient bandwidth usage. › Standards Based • Leverages RFC 7348 for VxLAN configuration

Table 1: Kaloom Virtual Gateway Benefits (VxLAN functionality)

Kaloom Virtual Gateway Feature Support

› VxLAN [Bridging, Routing, Gateway, Tunnel Endpoint] (RFC 7348)

The following list of features are currently in development:

› BGP-EVPN*

Please contact Kaloom to verify availability of the following list of features:

› Generic Network Virtualization Encapsulation (GENEVE)*

› MPLS*

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