



The Kaloom™ vRouter

Overview

Kaloom's virtual router (vRouter) is an embedded high performance vRouter within the Software Defined Fabric™ data center networking solution. As a key component of the Kaloom software defined product family, the vRouter uses standard routing protocols (i.e. BGPv4)¹, fully supports IPv6 and is optimized for Data Center fabrics. It eliminates the need for Data Center Operators (DCOs) to purchase and deploy physical routers or pay for expensive software based virtual routers and run them on compute servers. Kaloom's vRouter product offering enables telecom and cloud service providers, large enterprises and financial institutions the ability to create multiple virtual router instances within a vFabric and subsequently attach each vRouter instance to multiple layer-2 (L2) networks, thereby enabling data traffic to be routed from different internal networks and external networks.

In addition, Kaloom's vRouter is well positioned to deliver service function chaining. As an embedded component within Software Defined Fabric, the routing data plane of the vRouter can more easily be inserted into complex service function chains and enabled for automated provisioning of network applications having different characteristics.

In Figure 1 below, a high-level architectural overview illustrates the concept of Kaloom's vRouter as an integral and embedded component of Software Defined Fabric. In actuality, the vRouter is implemented as distributed control plane and data plane components, whereby the control plane components are containerized services running on X86 based server(s), while the data plane is distributed across different leaf switches within the fabric. In case of leaf or controller failure, vRouter functionality is automatically migrated in the fabric and service restored within seconds reducing downtime. As an integrated network function running within the network processor of the Software Defined Fabric, the vRouter provides several advantages, namely; lower cost, lower latency, and higher throughput, over other competitive and standalone product offerings on the market.

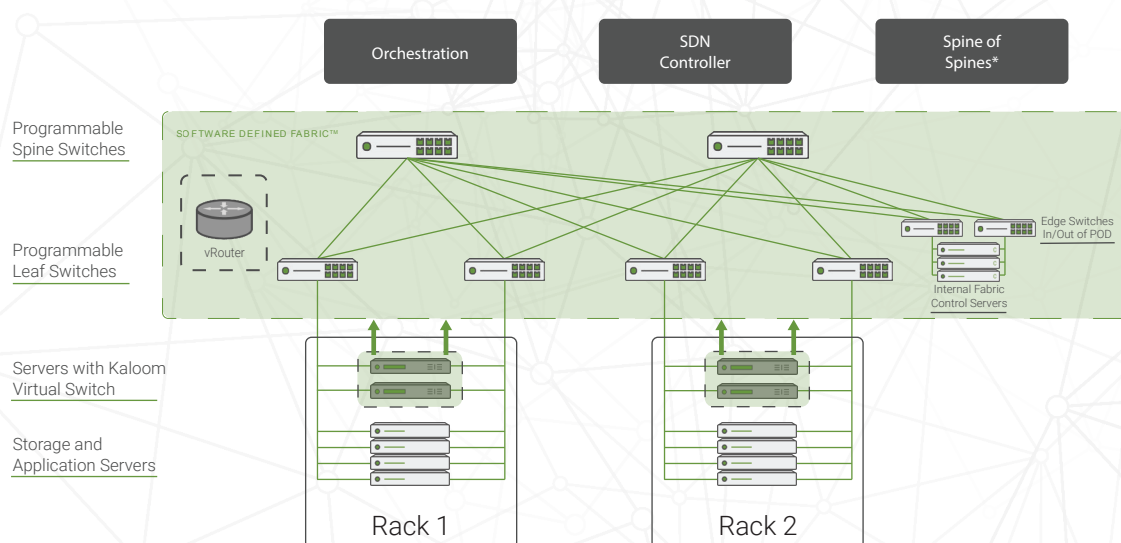


Figure 1: Kaloom Virtual Router Embedded in the Software Defined Fabric

*Roadmap Product

In Figure 2, the vRouter is shown as an L3 network icon as seen in the GUI of an actual fabric topology of a given vFabric being managed by a vDCO. The implementation of the vRouter in this scenario is to enable the engineering of traffic path flows between the L2 networks represented by switches that connect application servers represented by multiple termination points.

Table 1 below provides a listing of the benefits offered by the embedded Kaloom vRouter as part of Software Defined Fabric.

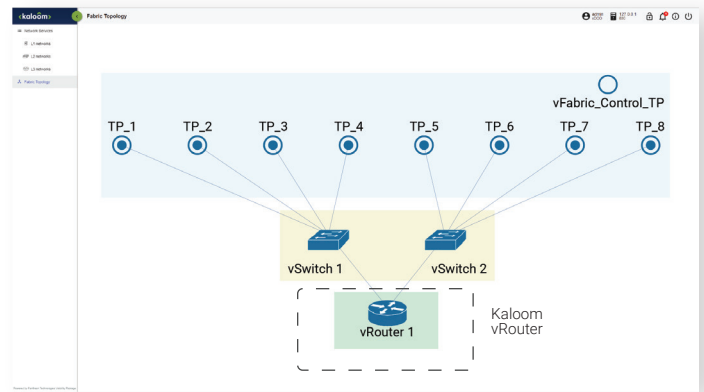


Figure 2: Kaloom Virtual Router in the vFabric Topology

Feature	Benefits
Virtual Router Functionality Embedded in Software Defined Fabric	<ul style="list-style-type: none"> ➤ CAPEX Reduction <ul style="list-style-type: none"> • Eliminates the need to purchase a separate/specialized physical router or software-based router and associated compute resources. • Enables the creation of multiple virtual router instances sharing the underlying physical resources of the fabric. ➤ Maximizes Performance <ul style="list-style-type: none"> • Data forwarding within a given vFabric is done at Software Defined Fabric's line rate and not in a software appliance. <ul style="list-style-type: none"> ▶ Leads to dramatic performance improvements (i.e. Tb/s versus Gb/s for throughput and latencies measured in nanosecond versus microsecond producing upwards of 50x improvements). • By having the routing data plane within the vFabric, subsequent VNF data planes can easily connect to it with the highest performance. ➤ Positioned for Service Function Chaining <ul style="list-style-type: none"> • The routing data plane can easily be inserted into complex service function chains created within Software Defined Fabric. ➤ Standards Based <ul style="list-style-type: none"> • Leverages the latest RFCs for router configuration (i.e., RFC 8349, RFC 8343, RFC 8344)

Table 1: Kaloom vRouter Benefits

Kaloom vRouter Feature Support

- BGP v4 (RFC 4271)
- MP-BGP (RFC 4760)
- SLAAC (RFC 4862)
- VXLAN [Bridging, Routing, Gateway, Tunnel Endpoint] (RFC 7348)
- Static Routing
- ICMPv6 (RFC 4443)
- Neighbor Discovery for IPv6 (RFC 4861)
- ARP (RFC 826)

The following list of features are currently in development:

- In-band Telemetry*
- BGP-EVPN*
- NMDA NETCONF / YANG model*

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

- OSPF v2 & v3*
- BFD*
- LLDP*
- gRPC API* (providing increased programmability)

*Roadmap Item

¹Roadmap Item. Additional protocol support (i.e. OSPF, IS-IS, BGP-EVPN) are roadmap items. Contact Kaloom to verify availability.