Product Overview

Highlights

- Completely software enabled and built with open networking principles
- Automates the underlay and virtualizes the network with a service-rich overlay
- Powered by the Linux-based Netvisor ONE Network Operating System
- Eliminates multiple SDN controllers, reducing costs and simplifying the network
- Seamlessly spans geographically distributed, multi-location DC environments
- Fully interoperable with existing brownfield network deployments
- Fabric-wide programmable, API-driven automation and policy management
- Secure traffic segmentation and strict multi-tenant services
- Integrated flow telemetry for pervasive network and application visibility
- Integration with vCenter, OpenStack and Kubernetes orchestration solutions

Pluribus Adaptive Cloud Fabric

Comprehensive Automation and Visibility for Cloud Data Center Network Fabrics

To empower digital transformation and frictionless hybrid multi-cloud operations, the network needs to evolve from a switch-by-switch operating model to a more dynamic, software-defined fabric environment. Legacy network infrastructure struggles to deliver the agility and flexibility organizations require to support modern cloud native workloads and advanced active-active data center architectures. To reduce complexity and improve operational agility, IT organizations need a simpler and more integrated approach to enable faster deployments, increase agility and greater scale to manage infrastructure and applications.

Virtualized and automated compute and storage have demonstrated what's possible when it comes to increasing efficiency, simplifying configuration and maximizing agility when the right technology is deployed. The advantages of a modern, virtualized and software defined network are compelling, and to create data center and metro environments that have the same level of automation as public cloud, one must virtualize everything — compute, storage, and the network.

Adaptive Cloud Fabric Overview

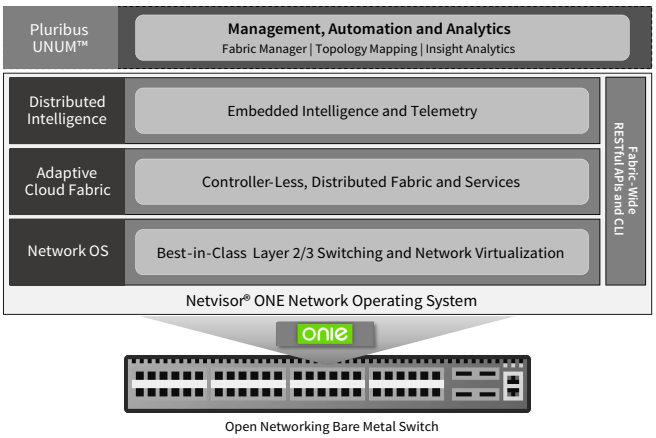
Industry research shows that over 50% of workloads will remain in on-prem private cloud data centers. To support digital transformation and the need for businesses to move at the speed of cloud, Pluribus Networks delivers the Adaptive Cloud Fabric, bringing the operational model of public cloud to the on prem data center. Based upon the next-generation of SDN technology, the Adaptive Cloud Fabric™ (ACF) empowers organizations to speed their transition to a completely automated and virtualized network that support cloud automation principles with a simpler, non-disruptive and more transparent architecture that makes it easier and faster to deliver, manage, and secure network services.

With its controllerless, distributed architecture, ACF delivers automated plug and play operation, enabling a powerful and holistic software-defined network that adapts to change, improves efficiency, and streamlines operations. ACF automates the underlay and a service-rich VXLAN overlay that virtualizes the network and is completely automated and abstracted from the underlying physical network hardware. ACF uses standardized protocols to interoperate with existing brownfield network infrastructure, is highly scalable and is optimized to deliver continuous availability for mission-critical enterprise and service provider environments.

The Adaptive Cloud Fabric can be deployed across a single data center, across a campus, or geographically distributed to seamlessly interconnect dozens of data centers over any existing Layer 2 or Layer 3 core. Unlike controller-based solutions that function as manually-stitched islands, ACF creates a single programmable and completely automated architecture across multiple locations to support distributed microservices applications, VM and container mobility, as well as modern active-active data center deployments. ACF can scale-out to support many thousands of ports, with multi-terabit capacity, performance and latency predictability, and can support millions of concurrent connections.

Powered by Netvisor ONE OS

The Adaptive Cloud Fabric is powered by the innovative Pluribus Netvisor® ONE Network Operating System (OS). Netvisor ONE is a Linux-based open, secure and programmable next-generation Network OS that delivers best-in-class Layer 2 and Layer 3 networking foundation and is built to optimize the power and performance of bare metal open networking hardware. Deployment-proven in production mission-critical enterprise and carrier networks, Netvisor ONE meets the most stringent performance requirements, and delivers the maximum levels of reliability and flexibility at scale without compromise. Netvisor ONE OS can be deployed as a stand-alone OS where each switch can be individually managed, including using tools such as Ansible. Alternatively, the Adaptive Cloud Fabric, a distributed and controllerless SDN underlay and overlay fabric solution that is powered by Netvisor ONE, can be activated with a license key.

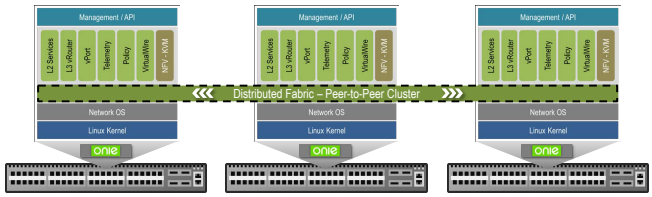


The Netvisor ONE Software-Defined Architecture

Adaptive Cloud Fabric Architecture

The Adaptive Cloud Fabric enables an SDN automated peer-to-peer distributed architecture that clusters Netvisor ONE powered switches into a symmetrical, unified operating domain. This novel approach enables a single command to program a network service fabric-wide in seconds, eliminating numerous operational steps to speed service delivery and reduce human error. Contrast this single command with typical solutions that require box-buy-box configuration and potentially thousands of commands to deploy a single network service across a fabric.

The Adaptive Cloud Fabric SDN software operates as a distributed application leveraging the CPU, RAM and SSD contained in every switch along with the Broadcom packet processing ASIC. These switches are already being deployed for physical connectivity and high speed packet forwarding. This highly efficient, distributed approach dramatically reduces integration, costs and deployment complexity when contrasted with a controller-based approach that requires multiple external controllers required at every DC location for underlay and overlay automation. This approach also provides brownfield interoperability with existing networks, allowing a non-disruptive and graceful migration to an SDN architecture.



The Adaptive Cloud Fabric architecture clusters member switches into a symmetrical, unified operating domain and eliminates the cost and integration, deployment and management complexity of underlay and overlay controllers

To enable massive scale and support distributed deployments, ACF features an innovative distributed control plane that allows multiple Netvisor ONE powered switches to be operated and managed as a single, distributed virtualized switch-router. Each physical switch maintains its own standards-compliant control and data plane to support massive scale, high-performance, interoperability and resiliency.

ACF runs on top of any standard Layer 3 underlay network inside or outside (WAN) the data center, allowing multiple fixed form factor switches to be managed as a single, virtualized large chassis switch even when distributed across multiple sites. The capability to span geographically dispersed sites enables a number of dynamic services and use cases that have previously been very challenging to achieve, including easily supporting active-active stretched data center architectures to improve application availability and reduce Recovery Time Objectives (RTO) for legacy and modern cloud native applications.

To meet the most stringent high availability requirements, the Adaptive Cloud Fabric architecture has no single-point-of failure and delivers a high degree of resiliency with fabric-wide sub-second failover. Fabric automation provides a single-point-of-management and control, distributes intelligence, integrates a broad range of advanced network services, and provides pervasive visibility for all traffic traversing the fabric.

Existing Network Interoperability

The unique peer-to-peer distributed architecture eliminates the undesirable limitations and complexities of SDN controllers and non-standard protocols like OpenFlow. This architecture, combined with ACF's ability to run as an application in the switch without changing the fundamental way the switch communicates, enables seamless insertion into existing networks and full interoperability with any standards-based networking equipment, protocols, or network topology. Netvisor ONE powered switches can work with any existing spine or WAN router, be inserted into the Spine layers or deployed into ring topologies, to enable a completely flexible and graceful migration to a SDN architecture, while preserving existing technology investments to significantly lower the total cost of ownership (TCO). Netvisor also supports BGP EVPN to interoperate with any third party EVPN fabric.

Runs on Open Networking Hardware

Because the Adaptive Cloud Fabric is powered by the Linux-based Netvisor ONE OS, it runs on many Open Compute Project (OCP) and Open Network Install Environment (ONIE) hardware compliant switches, including devices from Celestica, Dell Technologies, Edgecore, and the Pluribus Freedom™ Series of network switches. This flexibility allows organizations the choice of hardware to build scale-out networks with any combination of 10, 25, 40, 100 or 400 Gigabit Ethernet interfaces.

Manageability, Programmability, and Automation

The Adaptive Cloud Fabric architecture is built for automation and agility with native and atomic fabric-wide programmability—enabling operational changes and new services to be rolled-out quickly and rolled back, as needed. Any ACF member can act as the logical management point to define and provision fabric-wide configurations, services and policies across all Fabric member switches with a single command via UNUM Fabric Manager, the RESTful APIs, or Command Line Interface (CLI) with functional parity enabling both NetOps and DevOps automation.

Use Ansible as an automation frarmework or use the Pluribus UNUM™ Fabric Manager to automate provisioning and management of the entire network. In addition, the Netvisor ONE OS supports a wide array of Linux tools for scripting and automation such as Python, and supports traditional NetOps interfaces for SNMP, Syslog and sFlow. As a result, the ACF workflow automation reduces configuration time by up to 90% over traditional box-by-box operational models, lowers the risk of configuration errors, and dramatically improves service velocity and operational agility.

All switch-to-switch communications, network-wide configuration, policies and state information are dynamically updated across the fabric in real-time. An advanced 3 phase commit transactional model guarantees that device configuration is consistently maintained across every member network node. To minimize configuration errors, the Netvisor ONE OS offers dynamic configuration roll-back capabilities that allow the network operator to instantaneously restore a previous configuration across the entire fabric to prevent unwanted disruptions.

VMware, OpenStack and Kubernetes Integration Extends Automation

With the Adaptive Cloud Fabric enabled, Netvisor ONE integrates with multiple orchestration solutions to deliver on the vision of the software-defined data center. For example, leveraging the familiar vCenter console, a virtualization administrator or network operator can orchestrate and provision network resources in conjunction with ESXi hosts and VMs. vSAN services are also automated, including implementing vSAN cluster configurations across the network fabric without the manual configuration of multicast.

Similarly, organizations with OpenStack deployed can now provision compute, storage and network overlay services using the virtualized infrastructure manager (VIM) for one-touch provisioning.

Advanced Network Virtualization

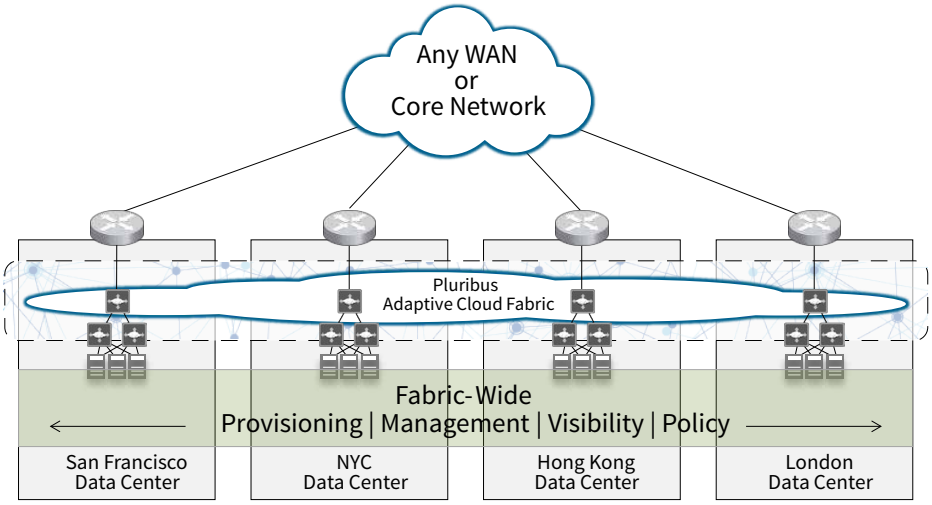
ACF automatically creates a mesh of VXLAN virtual network overlays across the fabric which create a logical abstraction of the physical network infrastructure. This virtualized network is software defined and highly automated by the SDN control plane, delivering a cloud operational paradigm to the NetOps and DevOps teams. The underlay, typically BGP Unnumbered, is used for stable and scalable transport and all services and security policies are defined in the overlay, enabling tremendous agility and service delivery to internal and external customers in seconds.

Unlike traditional networking or protocol-based fabrics which are box-by-box, the network operator provisions services through simplified network object abstractions (VLAN, Bridge Domains, L3 VPN, security policies and more) and declares their intent to deploy a network service object across all switches in the fabric such as “create VLAN id 110 scope-fabric” and the SDN control plane ensures that VLAN 110 is deployed on every switch with 100% confidence. Network virtualization also increases resource utilization and efficiency and improves security through the isolation and segmentation of traffic.

Distributed Architecture Enables a Multi-site Data Center Fabric

The Adaptive Cloud Fabric can seamlessly interconnect dozens of geographically distributed data centers or campus aggregation points over any existing Layer 2 or Layer 3 core, underlay, WAN or dark fiber network without requiring reengineering or proprietary protocols. Open networking switches combined with Netvisor ONE and ACF can either run at the border leaf location to provide data center interconnect (DCI) or they can be deployed throughout the data center leaf and/or spine layer to provide a multi-site data center fabric. This ability to unify and completely automate virtualized networking across multiple data center locations, including edge data centers, is a unique capability of ACF and cannot be matched by protocol-based or controller-based SDN underlay and overlay solutions.

The Pluribus Multi-site Data Center Fabric solution leverages sophisticated VXLAN-based Layer 2, Layer 3 and even Layer 1 VirtualWire overlay services to achieve transparent inter-site communication with dynamic end-point tracking over existing networks. The stretched fabric provides a single-point-of-management and delivers fabric-wide resiliency with sub-second failover for virtually any failure scenario. This highly available architecture is optimized to support mission-critical environments requiring stringent loss-less high availability.



The Adaptive Cloud Fabric can seamlessly interconnect distributed data centers over any existing WAN or Network

Distributed Fabric-Wide Intelligence

At the heart of the SDN control plane is the Virtual Port (vPort) technology which distributes intelligence and control to all connected end-points across the fabric. Each vPort is associated with an end-point MAC address and is auto-learned by all fabric member switches. The dynamic vPort database is contained on every switch in the fabric and is the cornerstone of the intelligent forwarding and security capabilities of the Adaptive Cloud Fabric.

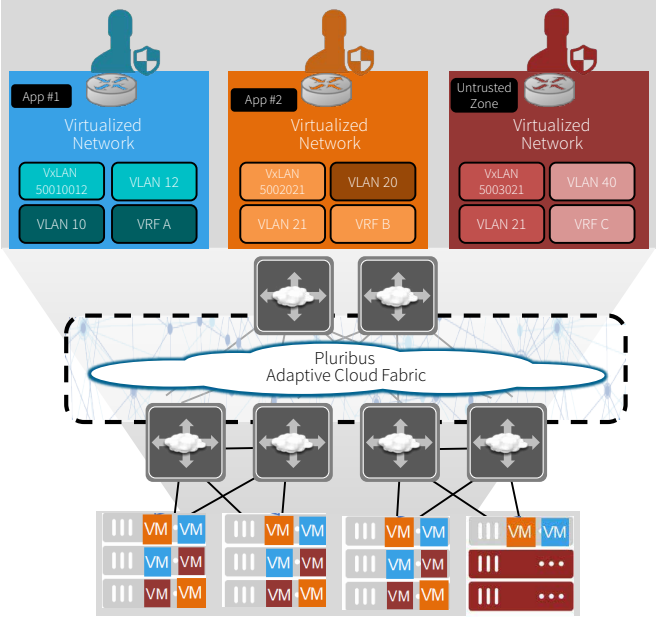
The vPort database tracks the location, identity, policy and history for each end-point, and dynamically shares state status to all fabric member devices in real-time, eliminating network broadcasts. This assures that movements are legitimate, replacing less-than-optimal "flood and learn" approaches with more efficient conversational forwarding. When mobile end-points, VMs or containers move from one port to another, even across data centers, end-point re-registration updates automatically in the vPort database in near real-time.

Secure Segmentation and Multi-Tenancy

The Netvisor ONE OS and Adaptive Cloud Fabric leverages the VXLAN overlay and Layer 2 VPNs such as VLANs or Bridge Domains and Layer 3 VPNs such as distributred VRFs to provide segmentation at the data plane and control plane level.

vNETs are designed to provide segmentation at the management plane layer. Each vNET functions like a separate physical switch, with its own control, data and management plane.

A specific vNET can be located on a single switch or replicated on multiple physical switches located anywhere across the fabric. There is no limit to the number of vNETs that can be created within a fabric, and network administrators can make use of all 4,000 VLAN IDs per vNET tenant.



The Netvisor OS enables the creation of independent, virtualized network containers

Anycast Gateway for L3 VPN

The Adaptive Cloud Fabric supports Anycast Gateway, enabling endpoints to use the same virtual MAC and IP gateway addresses on all leaf switches to support seamless endpoint mobility and increase routing efficiency. This allows performing the Layer 3 gateway function for data center endpoints directly on the first hop switch to enable more scalable and efficient routing by avoiding hairpinning and without unnecessarily increasing the control plane impacts on the switch CPU.

Scale Hyper-Converged Infrastructure Deployments

The Adaptive Cloud Fabric provides an ideal network foundation to stretch Hyper-Converged Infrastructure (HCI) deployments, such as VMware VxRail, across multiple active-active data center locations. The Adaptive Cloud Fabric architecture enables resilient, high-performance interconnection across HCI nodes for reliable, distributed, and high-performance data replication, resource sharing, and workload mobility. Capacity is elastic and can scale from several nodes to hundreds of nodes with linear performance. ACF enables seamless synchronous replication between two or more data centers enabling transparent operations with complete network and compute elasticity to meet stringent active-active data protection and disaster recovery (DR) requirements. The simplicity of the Pluribus Adaptive Cloud Fabric makes the network fundamentally transparent, with cloud-like scale, elasticity and adaptability, enabling IT organizations to focus on applications and services and to speed their transition to a completely Software-Defined Data Center (SDDC).

Integrated Monitoring Telemetry

The Adaptive Cloud Fabric provides FlowTracker, an integrated flow-telemetry monitoring function that monitors every flow traversing the fabric, enabing pervasive visibility of application and service flows without requiring dedicated network TAPS or TAP Aggregators, saving tremendous capital and operational expense.

The integrated telemetry monitors every TCP, UDP, ICMP, DNS< DHCP connection, including traffic within a VXLAN tunnel, across the entire fabric at the speed of the network to monitor east/west and north/south traffic flows, and virtualized workloads to expose important network and application performance characteristics.

This actionable insight provides a real-time view into end-to-end latency, duration, total bytes transferred, and the state of TCP connections, to track the dynamic behavior of network traffic.

Performance metrics can be viewed via CLI, API or through the Pluribus Insight Analytics™ module within the Pluribus UNUM management platform. The metrics provided by the embedded telemetry enables the IT organization to quickly pinpoint performance issues, accelerate troubleshooting, improve operational intelligence, identify security risks, and speed remediation activities.

Kubernetes- and VM-aware Fabric

KubeTracker is designed to provide NetOps teams with full visibility into East-West traffic flows between containers. KubeTracker enables NetOps teams to correlate containers with applications, on which hosts they reside and how they are connected to the fabric, allowing for a full understanding of distributed cloud native applications.

As containers are ephemeral and highly distributed, they drive a complex web of East-West traffic flows that need to be tracked over time for proper application and network performance monitoring. Until now, NetOps teams have not had visibility into these flows, making it difficult to verify application availability and network performance for containerized workloads. KubeTracker is an innovative new solution built into the Netvisor ONE OS and the Adaptive Cloud Fabric that empowers NetOps teams to quickly identify and troubleshoot any application availability issues, including going back in time even after containers have been spun down, enabling them to determine if network performance was or was not at fault.

Virtualized Network Packet Broker

A service that can be instantiated under the umbrella of the Adaptive Cloud Fabric is the Network Packet Broker (NPB), a virtualized and dynamic network packet broker fabric. NPB is based on the same distributed and controllerless architecture, can span multiple sites and has inherent load balancing across ingress (from SPAN/TAP) and egress (to tools) links. NPB can be deployed in two ways. It can be deployed as a dedicated out-of-band packet broker network overlay for high-scale, highly flexible TAP/SPAN port aggregation, packet filtering, replication and advanced packet processing to steer packet flows the appropriate monitoring and security tools. It can also be deployed as a fully virtualized function that runs at wirespeed, as a service, across the same Adaptive Cloud Fabric that carries production cloud data center traffic. In this case customers can avoid the expense of deploying TAPs and separate TAP Aggregation appliances.

Pluribus Networks, Inc.
www.pluribusnetworks.com