

Pluribus VirtualWire Software

Layer 1 physical switching feature set for the Netvisor ONE OS

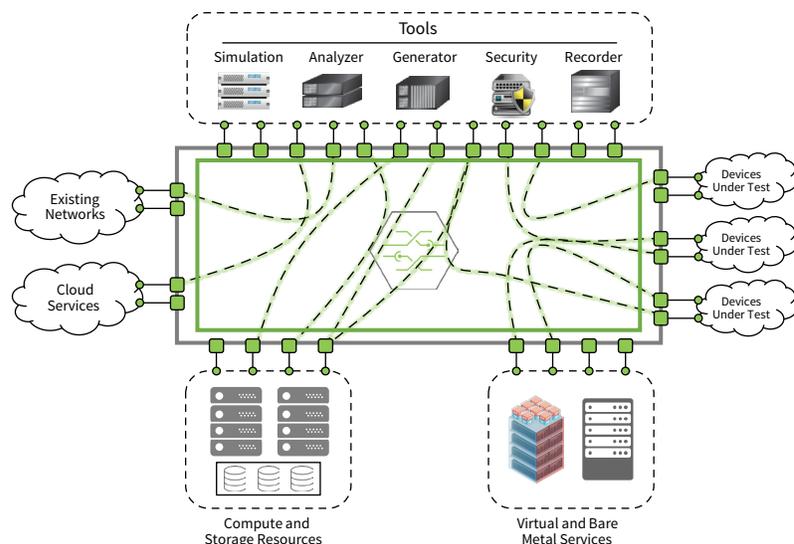
Highlights

- Comprehensive layer 1 switching feature set for high-performance low latency Open Networking switches
- Programmable software-defined architecture enables API-driven automation
- Intelligent layer 1-4 filtering and distributed traffic mirroring
- High-density interface flexibility for 1, 10, 25, 40 and 100 Gigabit connections
- Distributed architecture enables flexible and geographically distributed deployments
- Embedded monitoring telemetry for pervasive network and application visibility
- Integrated with Quali CloudShell for end-to-end automation

Pluribus VirtualWire™ is an integrated physical layer feature set for the Netvisor® ONE Operating System (OS) that enables native layer 1 switching capabilities on Open Networking hardware switches. VirtualWire transforms a traditional electrical Ethernet connection to emulate a physical wired connection so that interconnections are mapped between two or more physical ports in single switch, or across a multi-switch topology. As a result, VirtualWire enables the creation of a virtualized, software-defined patch panel that allows modern IP switching silicon to create transparent physical layer connections between devices. As a result, interconnected devices see each other as being directly connected, with all frames passed-through the interconnected ports as if they are connected by a physical wire. This enables all protocols and anomalous packets, such as CRC errors, to be exchanged to allow for unmodified, native connectivity and transparent failure propagation.

SDN Powered Automation

The VirtualWire solution leverages the power of next-generation SDN technology to transform how physical layer connectivity networks are built and operated. By leveraging the exceptional value and flexibility of Open Networking switches, operators can build highly scalable and dynamic environments that enable automating interconnections for lab operations or subscriber interconnection. The result is a data center-class environment that delivers high-performance and reliable layer 1 connectivity that replicate production-class networks to enable real-world test scenarios. The distributed architecture simplifies interconnection within a single, or across geographically distributed, locations to support large-scale operations. The result is dramatically simplified operations that improve equipment utilization, reduce provisioning time, and lower costs.



The VirtualWire solution provides physical layer 1 connectivity enabling interconnected devices see each other as being directly connected with all frames transparently passed-through the interconnected ports

Cable Once and Automate

VirtualWire enables the flexible, low latency and transparent cross-connection of any combination of switch ports across a single switch or multiple switches across a distributed topology enabling rapid changes without touching a cable. Each port can be configured as either a bidirectional, or unidirectional connection. Multi-port interconnection allows ingress traffic to be replicated at wire-speed to any number of egress switch ports. This enables multiple tools to receive a real-time copy of the targeted traffic. In addition to layer 1 functionality, Netvisor ONE can apply advanced network services to interconnected traffic as needed without incurring latency or traffic degradation. VirtualWire capabilities include:

- Transparency to Ethernet frames and protocols
- Policy-based wire-speed filtering
- Low latency media and speed conversion
- Link state tracking
- Port mirroring and traffic replication
- Network segmentation and multi-tenant services
- Production-class network resiliency and high availability
- Integrated telemetry for network visibility
- Integrated packet capture (on compatible switches)

Use Cases

VirtualWire provides consistent and reliable physical layer connectivity to support virtually any environment that requires continuous transparent layer 1 interconnection. Some example use cases for VirtualWire connectivity include:

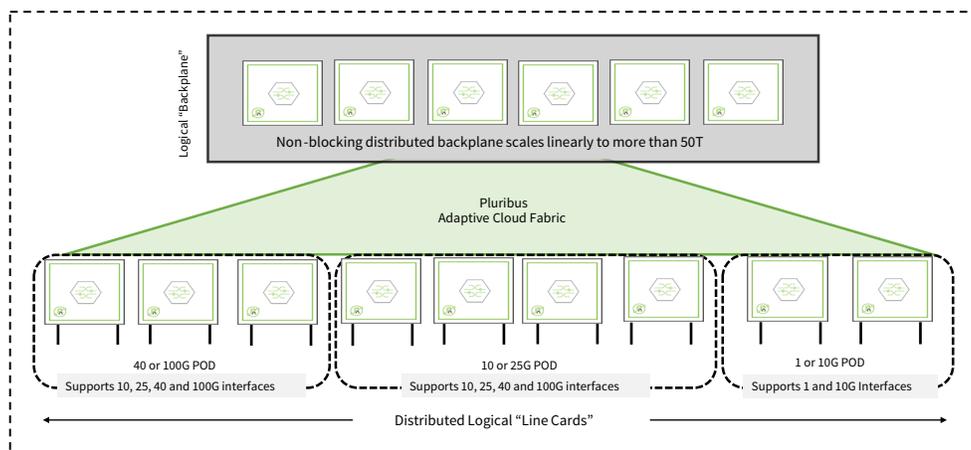
- Test lab interconnection and automation
- Validation and interoperability testbeds
- Lab as a Service (LaaS)
- CyberSecurity testing and validation
- Co-location and MSP cross-connect
- Automated subscriber interconnection

Runs on Open Networking Hardware

The Netvisor ONE OS runs on many Open Compute Project (OCP), and Open Network Install Environment (ONIE) hardware compliant switches, including the Pluribus Freedom™ 9000 series network switches. Open Networking hardware delivers high-performance switching and exceptional operational flexibility along with significant cost savings. Capacity is elastic, so additional switches and interfaces can be added as additional ports or bandwidth is needed. This enables seamless expansion to build multi-terabit scale-out designs capable supporting thousands of end ports and millions of connections to meet the most demanding operational requirements. This provides operators with a more flexible choice of hardware options to build scale-out networks with any combination of 1, 10, 25, 40 or 100 Gigabit Ethernet interfaces. To save space and reduce the cost per connection, these switches deliver up to 10x the port density per rack unit (RU) over traditional layer 1 switches with support for up to 128x 10G ports and 32x 100G ports in a single RU.

Scale-Out Deployments with VirtualChassis Architecture

Leveraging the distributed, scale-out architecture of the Adaptive Cloud Fabric, the Pluribus VirtualChassis™ architecture is built using high-performance, cost-effective single rack unit fixed configuration switches that collectively operate and behave as a single logical switch. The VirtualChassis is managed as one entity and seamlessly scales to support more than 4,000 ports. This provides the operational and manageability benefits of a chassis without the associated high cost and technical limitations, and a greater degree of operational flexibility.



Scale-out Pluribus VirtualChassis located in a single rack, distributed across top of rack, or deployed in geographically distributed locations

Intrinsic Automation Simplifies Operations

Extensive programmability and automation enables building new VirtualWire topologies in software in a matter of minutes. All configurations are software-defined enabling provisioning to be rolled-out quickly with minimal effort. Operators can provision and initiate configuration changes for all switches with a single command through Command Line Interface (CLI) or RESTful APIs, reducing configuration time by up to 90% over traditional box-by-box provisioning. Operators can define and store multiple test configurations for later use or reuse. Orchestration can be seamlessly integrated into many popular automation and orchestration platforms. Quali CloudShell integration allows end-to-end automation and orchestration across a global test lab or interconnect environment to orchestrate and automate the provisioning of virtually all test lab resources.

Warranty and Support

Pluribus Networks offers a wide range of advanced services spanning the entire test lab network lifecycle to protect investments and help accelerate success when deploying and optimizing the VirtualWire and the Netvisor ONE operating system for next-generation lab network architectures. Multiple extended support options are available, including on-demand global support, on-site support, advanced hardware replacements, and professional implementation services. Maintenance options includes direct access to a team of expert network engineers with deep networking experience, and our self-service on-line Customer Portal. For more information about Pluribus support options, visit <http://www.pluribusnetworks.com/support> or contact a Pluribus Networks authorized reseller.

Ordering Information

Software license and switches do not include support, order desired support separately.

Pluribus Network Freedom Series Open Networking switches

The Pluribus Freedom™ 9000 Series switches are a fully integrated, turn-key Open Networking solution that is available pre-configured with the Pluribus Netvisor ONE Operating System (OS) enterprise license. The Pluribus Freedom 9000 Series switches are best-in-class, programmable Open Network platforms built on the deployment-proven Broadcom StrataXGS® switching ASICs to provide high-capacity, standards-based networking.

- Pluribus Freedom 9532-C Switch — 32 QSFP28 ports support 1x 100/40G, or 4x 25/10G ports
- Pluribus Freedom 9572-V Switch — 48 SFP28 ports support 1x 25G or 1x 10G and 6 QSFP28 ports support 1x 100G or 1x 40G as uplink ports or 4x 25G or 4x 10G ports
- Pluribus Freedom 9232-Q Switch — 32 QSFP+ ports support 1x 40G or 4x 10G (up to 104 ports)
- Pluribus Freedom 9272-X Switch — 48 SFP+ ports support 48x 1/10G and 6 QSFP+ ports support 1x 40G or 4x 10G
- Pluribus Freedom 9372-T Switch — 48 RJ-45 ports support 48x 1/10GBase-T and 6 QSFP+ ports support 1x 40G or 4x 10G

Netvisor ONE VirtualWire License Add-on (licensed per device and requires Enterprise Edition license)

The VirtualWire feature set enables layer 1 switching capabilities for lab automation, interconnect and network packet broker capabilities. VirtualWire is an add-on license per Freedom 9000 series switch. VirtualWire requires a Netvisor ONE enterprise license for operation on white box switches.

- ONVL-10G-VW-LIC – VirtualWire service license for 10G switch
- ONVL-25G-VW-LIC – VirtualWire service license for 25G switch
- ONVL-40G-VW-LIC – VirtualWire service license for 40G switch
- ONVL-100G-VW-LIC – VirtualWire service license for 100G switch

Netvisor ONE Fabric Edition Perpetual License (licensed per switch device adds Adaptive Cloud Fabric functionality)

The Adaptive Cloud Fabric license can be added to enable the distributed Fabric architecture. One license is required to per active switch device in addition to the VirtualWire license.

- ONVL-10G-PLEX-LIC — Pluribus Netvisor ONE Fabric Edition for 10 GbE switches
- ONVL-25G-PLEX-LIC — Pluribus Netvisor ONE Fabric Edition for 25 GbE switches
- ONVL-40G-PLEX-LIC — Pluribus Netvisor ONE Fabric Edition for 40 GbE switches
- ONVL-100G-PLEX-LIC — Pluribus Netvisor ONE Fabric Edition for 100 GbE switches

Specifications

For a complete list of features and specifications, please see the Netvisor ONE and relevant Pluribus Freedom 9000 series switch data sheets. In addition to the base capabilities provided by the Netvisor ONE OS and optional Fabric license, VirtualWire capabilities include:

- One:Many TAP/mirror aggregation
- Many:Many TAP/mirror aggregation
- Many:One TAP/mirror aggregation
- Bypass switch for inline tool deployment
- Bypass switch heartbeat packet to detect inline tool failure
- Layer 2/3/4 traffic filtering
- Layer 1 cut-through mode
- Error pass-through
- RFC 3176 sFlow
- nvFlow for TCP connection visibility
- nvFlow for VXLAN
- nvFlow for Virtual Link Extension (VLE)
- Flowtrace (trace synthetic flows across the fabric)
- IPFIX export for nvFlow
- Integrated packet capture/analysis with
- TCPDump (supported on selected switches)