VirtualWire Lab Automation Solution
Simplify, Automate, and Optimize the Test Lab and Cyber Range Network

The lab is the center of innovation and is under pressure to increase agility, accelerate test schedules while reducing the cost of testing. The common challenge is that lab infrastructure often relies on manual processes that do not meet the expectations of speed and reliability. Cabling requests for configuration changes create bottlenecks and costly test equipment is frequently underutilized due to inaccessibility. These delays impede the entire release velocity and the ability for your lab to scale and meet business expectations. The lab infrastructure needs to become more automated, dynamic, and efficient to allow cloud-like operations that enable expensive resources to be delivered as a service while reducing the risk of errors.

The VirtualWire™ solution transforms lab and cyber range operations into an agile, elastic and self-service environment that improves resource utilization, decreases test cycles, and lowers operational costs. Leveraging next-generation software-defined networking (SDN) technology, VirtualWire scales and optimizes lab environments with production-like precision while reducing complexity and improving operational efficiency. The result is a dynamic operating environment that enables your organization to:

- Optimize and streamline test lab operations
- Cable once and automate to instantly share expensive local and remote lab resources
- Create, automate and provision production-like test environments in minutes, not days
- Share expensive resources across distributed labs and eliminate redundant test equipment
- Support high-density copper or fiber interfaces with seamless upgradeability to next-generation network speeds including 10, 25, 40, 100, and 400 Gigabit Ethernet connections
- Gain real-time visibility into lab performance with embedded network analytics to track test activities and measure resource utilization

BUILDING THE SOFTWARE-DEFINED TEST LAB
The VirtualWire solution combines deployment-proven data center-class production networking with specialized layer 1 networking and lab-specific capabilities to enable lab operators to replicate network topologies, interconnect test devices and simulate production network conditions. VirtualWire is an integrated physical layer feature set of the Netvisor® ONE Operating System (OS) that enables native layer 1 switching capabilities on Champion ONE Open Networking hardware switches.

VirtualWire enables the creation of a virtualized software-defined patch panel that enables transparent physical layer connections between test equipment, tools and devices across a distributed topology. As a result, interconnected devices see each other as being directly connected, with all frames passed-through the interconnected ports as if they were connected by a physical wire. This enables all protocols and anomalous packets, such as CRC errors, to be exchanged allowing for unmodified, native connectivity and transparent failure propagation.

CHAMPION ONE™
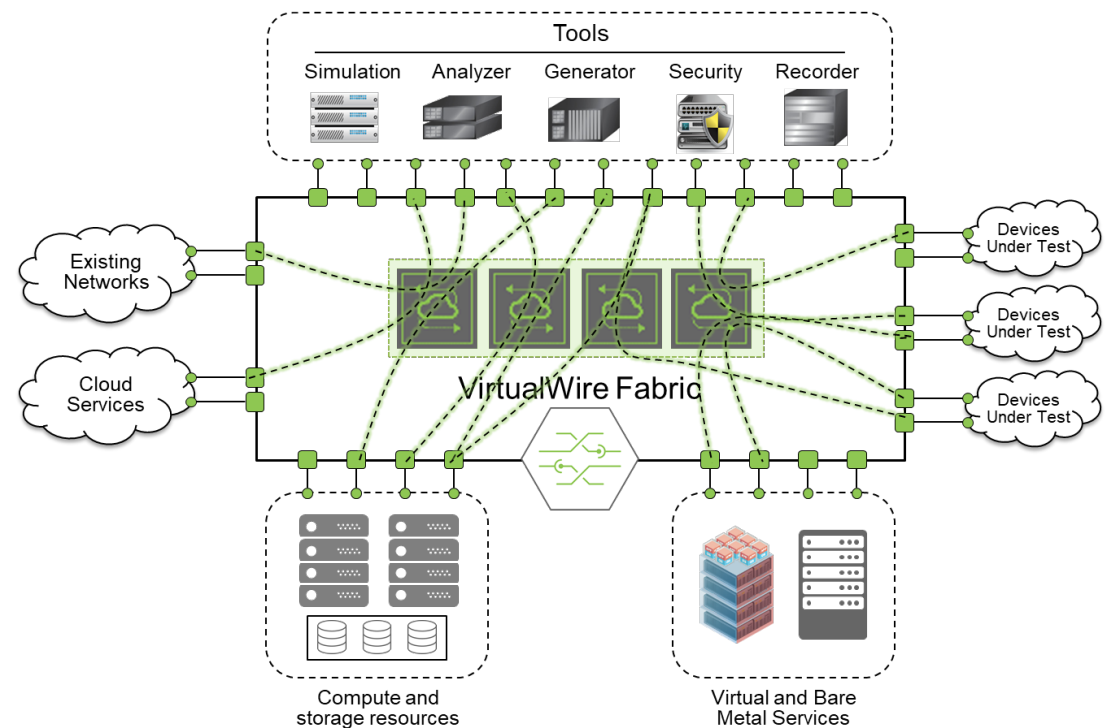
CABLE ONCE AND AUTOMATE EVERYTHING

To optimize test lab and cyber range operations VirtualWire delivers extensive programmability and user accessible APIs to automate building new test configurations in a matter of minutes to enable rapid access to distributed lab resources and share expensive test equipment across multiple test setups. VirtualWire delivers essential capabilities to optimize the lab environment including:

- Highly secure operating environment
- Policy-Based wire-speed filtering
- Low latency media and speed conversion
- Auto-Detect port state change identifies when a port goes down or an end-device becomes inoperable
- Port mirroring and traffic replication
- Secure traffic segmentation and tenant services
- End-to-end automatic discovery of available paths
- Automated path discovery with guaranteed connectivity
- Dynamic bandwidth utilization with path sharing
- Path resiliency and automatic failover
- Resilient and highly available

Configurations are software-defined via RESTful APIs or Command Line Interface (CLI) enabling provisioning and operational changes to be implemented seamlessly, without manually rewiring or reconfiguring the network. Multiple configurations can be stored across the VirtualWire Fabric allowing lab operators to define and store any test configuration for later use so any setup can be quickly reconfigured on-demand in seconds. Orchestration can be seamlessly integrated into automation platforms including the Ansible, VMware vCenter console, Quali CloudShell and homegrown lab automation platforms.

RUNS ON OPEN NETWORKING HARDWARE

The VirtualWire solution runs on Champion ONE Open Networking switches that delivers high-performance operation with predictable performance and latency to support thousands of concurrent lab interconnections.

Champion ONE Open Networking switches offer higher port densities and a wider range of interface speeds than traditional legacy layer 1 switches. This provides lab operators with the flexibility to build the lab network with any combination of 1, 10, 25, 40 or 100 Gigabit Ethernet interfaces with significant cost savings and expandability to 400 Gigabit connections in the future. 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 – supporting up to 128 x 10G ports and 32 x 100G ports in a single RU. Capacity is elastic, so additional ports can be added for seamless expansion with multi-terabit capacity.

DISTRIBUTED ARCHITECTURE SCALES DEPLOYMENTS

Leveraging the distributed SDN architecture of the Pluribus Adaptive Cloud Fabric™, the VirtualWire solution clusters the Champion ONE Open Networking switches into a distributed Fabric that collectively operates as a single logical switch. The Fabric is managed as a single entity and scales to support more than 4,000 ports with capacity of more than 60 terabits to meet the most demanding operational requirements.

The VirtualChassis™ can be deployed in a single-rack to leverage existing space, cables and power, or disbursed across different racks to distribute power consumption and heat dissipation across the lab. This flexibility allows deploying switches closer to the DUTs to simplify cabling and distribute connections with shorter cable runs to reduce the cost of expensive optics.

SEAMLESSLY INTERCONNECT DISTRIBUTED LABS

The VirtualWire solution can be stretched across geographically distributed lab environments over any existing WAN or network. This enables the seamless implementation of test connections and the sharing of lab resources across any connected remote location.

INTEGRATED MONITORING AND ANALYTICS

Monitoring telemetry is embedded on every switch port enabling pervasive visibility for application and service flows traversing the lab without dedicated network monitoring probes. The integrated telemetry monitors every connection at the speed of the network for granular insight into the performance characteristics of test connections and application conversations. Performance metrics can be accessed via CLI, IPFIX or APIs to feed into existing analytics platforms, or through the Pluribus Insight Analytics™ performance management platform.

SUMMARY

The VirtualWire solution leverages the power of next-generation SDN technology to transform how lab connectivity networks are built and operated. By leveraging the flexibility and exceptional value of Champion ONE Open Networking switches, organizations are able to build highly scalable and dynamic environments that enable cabling once and automating operations. The result is a data center-class lab Fabric that delivers high-performance interconnection to build dynamic test environments that are an exact replication of a production network to support real-world testing scenarios. The distributed architecture simplifies deployments within a single lab location and enables the interconnection across geographically distributed locations to support very large-scale test operations. Automation dramatically simplifies operations, improves equipment utilization, reduces the risk of errors and speeds test execution cycles without touching a cable.