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Three Use Cases for a Virtual Patch Panel

Rethinking Test Lab Automation for the Modern Age

In almost all aspects of IT, the pace of change and innovation has been astounding. However, one area stuck in the past is the test lab, where the lab infrastructure that connects expensive test equipment from the likes of Ixia and Spirent to the units being tested has not changed for decades. Organizations continue to deploy expensive test ports at every lab location, and manually re-cable the lab every time they need to run a new test. This introduces a number of issues and constraints – complexity of equipment connectivity, re-cabling, troubleshooting, scaling, underutilization of expensive test equipment and ultimately, slow test cycles that impact efficiency and competitiveness. Reconfiguring the lab infrastructure has turned into the worst nightmare of the lab administrator and test engineer. A few companies have attacked this manual approach with custom Layer 1 matrix switches. While implementing Layer 1 switches can certainly automate the test lab infrastructure, they are expensive and limited to a single lab site.

Challenges

1. Frequent manual “re-wiring” of lab resources and network topologies is error prone and time consuming
2. Expensive test equipment (e.g., traffic generators) cannot be shared across teams
3. Captive lab resources are often located in lab silos around the company, where they are simultaneously underutilized and inaccessible to many
4. Limited or no automation of test environments
5. Lab resources cannot be shared across multiple geographically dispersed labs

Advances in open networking software and programmability have made possible a new way to automate, reconfigure, optimize and scale your lab infrastructure across multiple sites. With this new technology, you can quickly build new topologies via software-defined networking (SDN) control in a matter of minutes with visibility and troubleshooting built in, all at a fraction of the cost of traditional Layer 1 matrix switches.
Introducing VirtualWire from Pluribus Networks

To solve these IT lab challenges, Pluribus Networks has introduced VirtualWire™, an open networking solution that enables Layer 1 to be tunneled through a standard white box Ethernet switch so that any two ports across a single lab site or multiple lab sites can be stitched between any two ports. This speeds lab reconfiguration for faster time to test, lowers the operational costs of manual cabling and lowers capital costs by sharing test ports.

The Pluribus VirtualWire switch is a highly flexible, highly scalable physical layer non-blocking switching matrix powered by the Pluribus Netvisor® ONE Operating System. It is designed to build dynamic, high-performance lab connectivity with packet/application/link layer visibility. VirtualWire also allows storage of well-known physical configurations and reproduces them at will for subsequent testing. A powerful RESTful API integrates within existing management and orchestration tools.

With this technology, Layer 1 can be tunneled through a standard low-cost white box Ethernet switch so that any two ports across a single lab site or multiple lab sites can be stitched together so they appear to be adjacent. This VirtualWire solution is effectively a pseudowire tunnel that carries all traffic between the two ports transparently, including passing errored packets that are typically dropped by an Ethernet switch. Here are three use cases for using this technology to make the IT lab more efficient and effective.

Benefits

1. Wire-once physically then “re-wire” test lab configurations in software only - eliminate manual, error-prone, slow topology changes
2. Dramatically reduce testing cycle time and get your new products and services to market faster than the competition
3. Maximize utilization and sharing of expensive test equipment across teams and projects
4. Enable sharing of lab resources across multiple geographically dispersed labs
5. Enable extensive automation of test environments
Use Cases

1. Lab Automation

Manual cabling is time-consuming, error-prone and inflexible as it is limited by device proximity and transceiver/media/speed capabilities. Intra-rack cabling requirements are topology specific and difficult to organize. Reconnecting the same devices in a different topology involves inefficient and error-prone manual effort. Plus, it is difficult and time consuming to reproduce previously created topologies.

Instead, with the VirtualWire technology, you can:

- Implement a distributed software-programmable patch panel with automated Layer 1 path building and program virtual cables between devices
- Build a “Virtual Chassis” architecture with a single point of management
- Implement a “pay-as-you-grow,” scale-out architecture based on cost-effective white box open networking 1RU switches
- Reconfigure any topology implementation easily via pure software reconfiguration through RESTful API and CLI integration
- Save and reuse exact topology information automatically
2. Efficient Lab Equipment Sharing

Lab services are usually very manual: you have to go to the lab owner, then go to any and all equipment owners and determine what to reserve according to your needs. It is a very manual, time-consuming effort that leads to needless reserving of entire blocks and racks, and has long lead times for both setup and dismantling.

With the VirtualWire model, you can efficiently share lab equipment, thus allowing you to:

- Rack and cable once, using an SDN-programmable patch panel
- Reserve equipment and implement any topology dynamically
- Increase your lab equipment utilization by 300% or more
- Avoid the need for teams to repurchase expensive equipment

3. High-Availability Lab Testing

The challenge with testing equipment for high availability is the fact that equipment may cross data centers and borders, and the ability to rapidly test a failure isn’t so easy. Would you have someone stand in a remote data center to just “pull a plug”?

DUT - Device Under Test
With VirtualWire technology, you can rapidly configure and test any interconnection scenario through a virtual patch panel based on a standard white box Ethernet switch. Now, when testing for high availability, you can:

- Avoid cost-prohibitive, locally distributed test assets
- Employ a centralized test center to save on costs
- Span across encryption-restricted countries by logging in and testing from offshore – no local assets needed
- Conduct repeatable high-availability regression testing

There are a lot of additional technical benefits that VirtualWire technology brings for lab automation:

1. Layer 1 Packet Transparency
   - Transparent to Layer 2 and 3 control plane protocols
   - Transparent to Ethertypes/protocol encapsulations
   - Transparent to errored frame errors

2. Speed and Media Conversion
   - Any copper to any fiber media conversion
   - Any fiber to any fiber media conversion (MMF/SMF parallel/duplex)
   - Any port speed to any other port speed (e.g., 10G to 100G)

3. Advanced Wire-Speed Packet Filtering
   - Wire-speed filtering based on Layer 1/2/3/4 packet header information
   - Select multiple actions for filtered packets: copy to one or multiple ports, steer to any other port, drop, attach a VLAN tag packet
   - Program filtering policies automatically across the entire VirtualWire fabric

About Pluribus Networks

At Pluribus Networks, we are focused on solving our customers’ problems and finding innovative ways to help conserve time, maximize productivity, reduce costs and eliminate errors. Pluribus Networks’ unique VirtualWire lab automation solution delivers immediate value by enabling our customers to:

1. Reduce testing cycle time and get new products and services to market faster than the competition
2. Save money by automating and simplifying configuration
3. Reduce capital and operational costs by optimizing hardware, software and people resources
4. Reduce errors by cabling once physically and reusing/reconfiguring through software
5. Increase capacity by scaling the lab on demand
6. Increase utilization by efficient resource access across geographically distributed locations

Learn more about the Pluribus VirtualWire Test Lab Automation solution at https://www.pluribusnetworks.com/products/virtualwire/.