

The Media Cross Connect

An important tool for next generation Lab Management

As a network equipment manufacturer, service provider, carrier, or enterprise, chances are good that you have encountered challenges in your test lab. Companies are facing increasing competitive pressures to bring products and services to market in shrinking timeframes. At the same time, the tests needed to ensure delivery of quality products and services are becoming more complex. Today's test labs are moving towards test automation with sophisticated automation software. However, the physical connectivity of equipment remains a laborious manual process.

In this article we will examine the network infrastructure of many labs, showing how relying on the manual configuration of test networks adversely affects the productivity of a test lab. We will then introduce the Media Cross Connect, an important tool for managing and automating the configuration of test networks, optimizing your lab for responsiveness and best use of capital expenditures, and setting the stage for the next generation of lab management.

The Manually Configured Lab

Today's test lab is outfitted with more sophisticated hardware and software than ever before, all designed to help test engineers perform their job more effectively and efficiently. While powerful automation tools exist to facilitate the logical execution of tests, little is being done to address the configuration of the physical connections that network all these devices together.

There are a number of shortcomings in the lab environment where labor-intensive manual configuration inhibits lab productivity.

More effort spent on test set-up than on testing

Manual patch panels require interconnection between multiple test beds for testing and sharing of resources. For each test performed, test equipment must be physically moved, cabled to proper equipment, configured, in complex scenarios, and then disconnected to prepare for the next test.



The constant swapping of these cables leads to either chaos or increased management effort. Either way, valuable time is spent trying to manage the lab instead of actually testing. Software programmable test configurations let you take control of this labor-intensive portion of lab-life.

Not enough working hours in the day

The limiting factor for test velocity in most labs is requiring engineers to be physically present to run tests. Scripting tests ensures that they run consistently every time, but with manual recabling, queuing a series of dynamic test scripts is impossible since the cabling cannot be changed within the scripts. Round-the-clock testing, often referred to as a "Lights Out Environment", would increase the lab's production without having to increase personnel.

Re-Testing - Time is Money

In the case of test labs, moving cables around frequently increases the chances that a problem will arise: a wrong connection is made, a cable or connector is damaged, or a fiber optic component is contaminated with dirt. All these incidents compromise the accuracy of tests, waste precious test hours, and result in re-testing that wreaks havoc in your lab's testing schedule. "Wire-Once" configurations eliminate physical manipulation of cables and decrease the number of problems introduced by human intervention.

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Inefficient use of lab resources

You never want people having to wait to use equipment, or equipment sitting around unused. Ideally, every technician would have their own test bed of equipment. Economically, this luxury is not feasible even in the most successful organizations. To complicate matters further, there is more and more cross-function within the lab environment. How do you manage equipment and allocate usage among all the people that need access?

Each of these issues can adversely affect the bottom line however it is measured. Testing affects every metric of a company's success: product quality, customer satisfaction, development time, time to market etc. Although testing is a critical element of an organization's success, fiscal constraints typically require many labs to do more with less. Companies that can operate their labs at the highest level of productivity and keep them from becoming the bottleneck of the organization will succeed in today's business environment.

Faced with this knowledge, the question becomes how to better manage the physical network connections in a test lab and how to automate their configuration. What is needed is an intelligent patch panel that will allow those connections to be altered - added, dropped, reassigned - at any time, through software, and ultimately without human intervention.

Is such a device possible? Yes. In fact, it already exists.

The Media Cross Connect

The Media Cross Connect is a scalable, digital patch panel that allows users to program a connection from any port to any other port within the system using a non-blocking digital backplane. Unlike a manual patch panel where connections and configuration must be physically performed, the Media Cross Connect allows users to make these changes through software commands. Logical cable configuration also enables remote configuration and control of test topologies.

The media interfaces and protocols supported by the Media Cross Connect reflect the flexibility of the system: fiber optic and copper interfaces, and protocols up to 10 Gbps. Using a modular blade technology, the Media Cross Connect allows these interfaces and protocols to be mixed in one chassis. Unlike a manual patch panel, it

allows you to map a copper input to a fiber optic output or single-mode fiber to multi-mode fiber, eliminating the need for standalone converters.

Software control of the labor-intensive process of cable management equips the lab with the missing link to a totally automated lab environment.

Wire-Once Technology

This technology is what makes the Media Cross Connect an invaluable asset for testing environments. Once test equipment, network devices, and devices under test are initially connected to the Media Cross Connect, there is no need to physically move the cables to configure or re-configure test topologies. All mapping - port to port, port to multi-port, monitoring, and mirroring - is done using software commands through the control port.

This capability allows for total automation of your lab environment. Using software, you can standardize tests and use pre-determined templates for your test topologies to reduce or eliminate cabling anomalies that can cause erroneous test results. In simple configurations, recalling test connections saves minutes. In complex scenarios, the savings could be days. In either case, many days and possibly weeks of labor can be saved with a wire-once configuration over the course of a year.

Wiring once eliminates issues that result from handling fiber optic cables such as damaged connectors or fiber contamination. It reduces the number of re-tests resulting from these issues, increasing the lab's overall productivity.

Lights-Out System Management

By eliminating the need to physically patch connections, deploying the Media Cross Connect allows the lab to support 24/7 testing without adding personnel. Tests and test configurations can be securely scripted with a few common Tcl commands, scheduled, and queued to run sequentially, maximizing the productivity of your equipment and test velocity of your lab. Results can be logged and progress can be monitored remotely, if necessary. Remote notification of problems that occur during tests can be programmed, as well.

Remote, secure, and logged user access allows your lab equipment to be shared within a group or among cross-functional organizations, whether located in the same building or another country.

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Technically Robust Architecture

As a protocol-transparent device operating at the physical network layer, the Media Cross Connect needs the ability to interface with a wide range of data rates and media types.

Protocol support ranging from T1/E1 all the way to 10 Gig Ethernet including Fibre Channel support is an important feature. Using a blade design makes it possible to handle different protocols within the same chassis, either using 2R conditioning or 3R signal retiming, with each connection operating independently.

Media support includes fiber optic and copper cables while interface support includes pluggable transceivers (SFP and XFP) that use Digital Diagnostics (SFF-8724) at the port level. Pluggable transceivers offer almost limitless connection flexibility, which is paramount in a lab environment. Today, SFPs are available for virtually any application including multi-mode and single-mode, CWDM and DWDM fiber optic interfaces, 100/1000Base Ethernet, FireWire (IEEE-1394a/b), and Digital Video (SDI/DVB) copper interfaces.

The physical form-factor is also important in the design of a Media Cross Connect. With rack space at a premium in most lab environments, high density form factor and scalability are important considerations. Systems scalable from 32 to 288 ports in 1 to 9 rack units accommodate the physical constraints in today's labs.

Efficient Lab Management

Deploying Media Cross Connects in a lab environment allows the creation of test equipment pools to be shared among users. Other systems and network equipment necessary to create test scenarios may also be pooled. This pooling and sharing minimizes the amount of equipment necessary to support the operation of the lab and maximizes the use of existing equipment. Tracking equipment inventory is simpler using the management software of the Media Cross Connect.

The labor savings realized by the elimination of manual cabling for tests and test configurations, especially with the complexities in today's test environment, can range from hours to weeks over the course of a year. Freeing personnel from the cabling functions will also enhance the quality of life in the lab environment.

Secure remote access is another feature that enhances lab efficiency. Testing from home, verification or debugging problems remotely and sharing equipment among several organizations or sites, are just a few of the cost-saving, efficiency-enhancing programs the Media Cross Connect will allow you to deploy.

Facilitated equipment management, secure remote access, automated configuration, and 24/7 testing enables your lab to run at top productivity levels.

Figure 1
STORAGE LAB APPLICATION

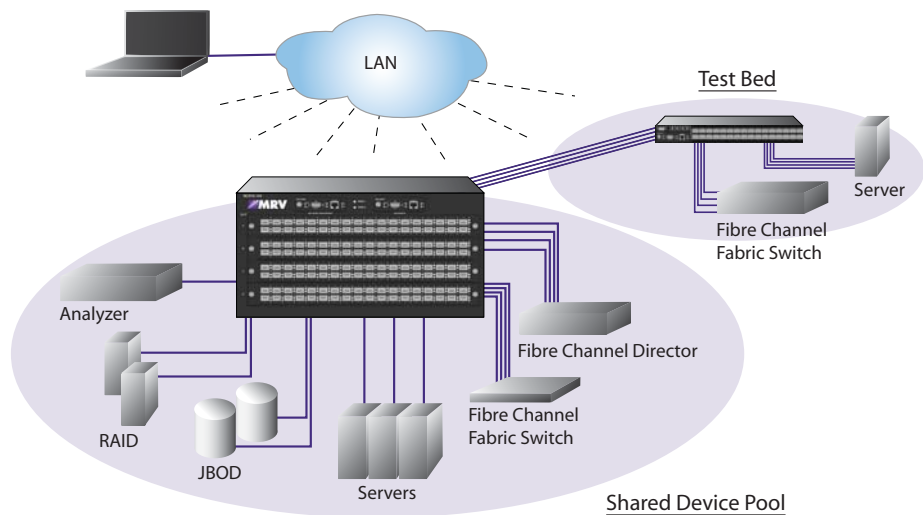


Figure 1 shows the Media Cross Connect used in a storage lab environment. Again through software, test topologies and configurations can be scripted and repeated to minimize test time, increasing test velocity within the lab, and accelerate the time-to-market for new products.

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Figure 2
MANUFACTURING LAB APPLICATION

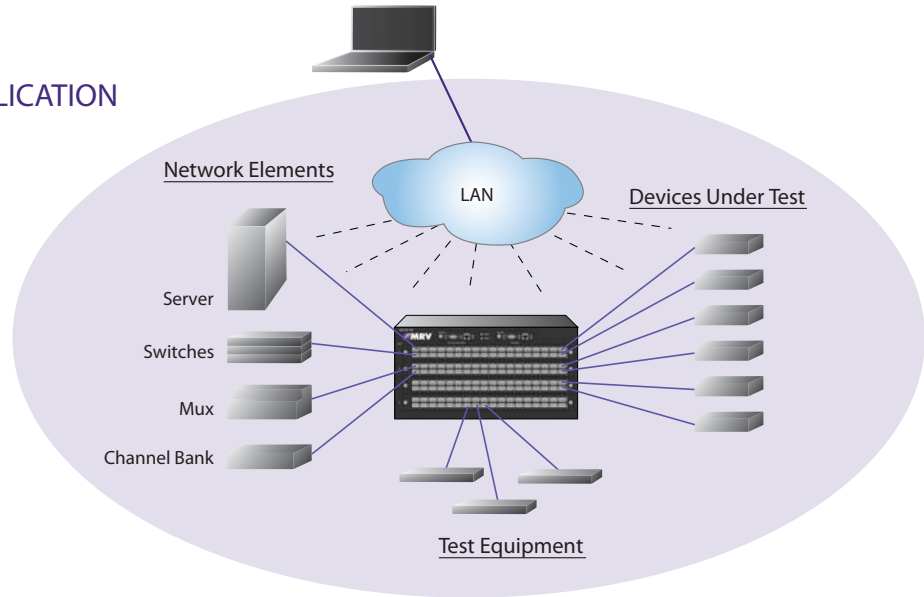


Figure 2 shows a typical manufacturing lab setup. The Media Cross Connect sits in the logical center of the lab network where it controls the connections between all devices with the lab. In this application, the Media Cross Connect allows test equipment and network devices (servers, switches, and devices under test) to be interconnected and shared with all or some users. Expensive equipment is shared and usage maximized with total automation. Test scripts and the test topologies can be stored in software and implemented without human intervention.

Figure 3
TEST EQUIPMENT SHARING

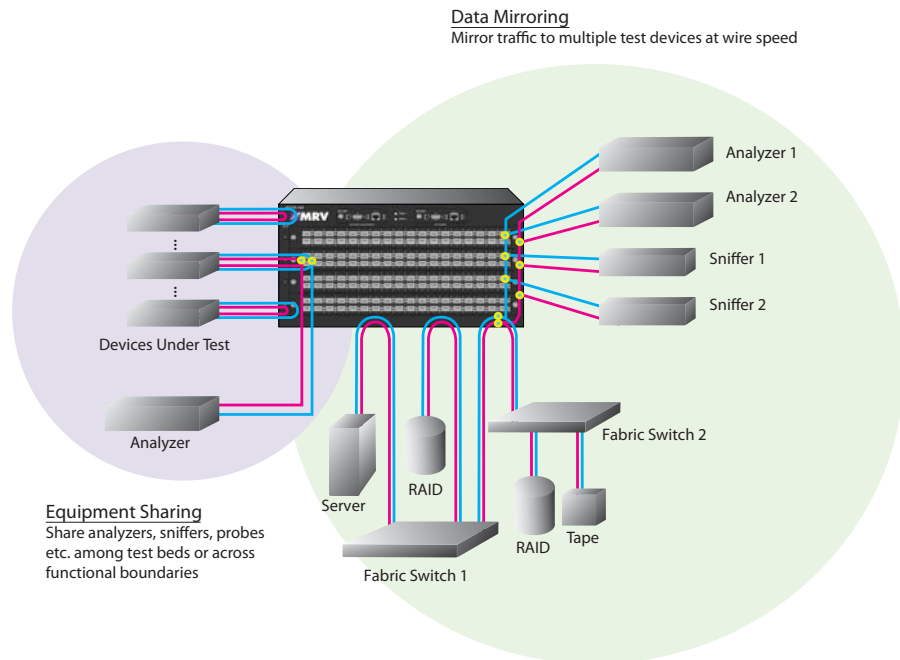


Figure 3 shows the Media Cross Connect sharing test equipment in many different configurations. One port can be set up to mirror real-time data to many ports connected to a variety of test sets or analyzers, or one test set can be used to test multiple devices using a software script to port to each device.

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Figure 4
NETWORK SIMULATION TEST

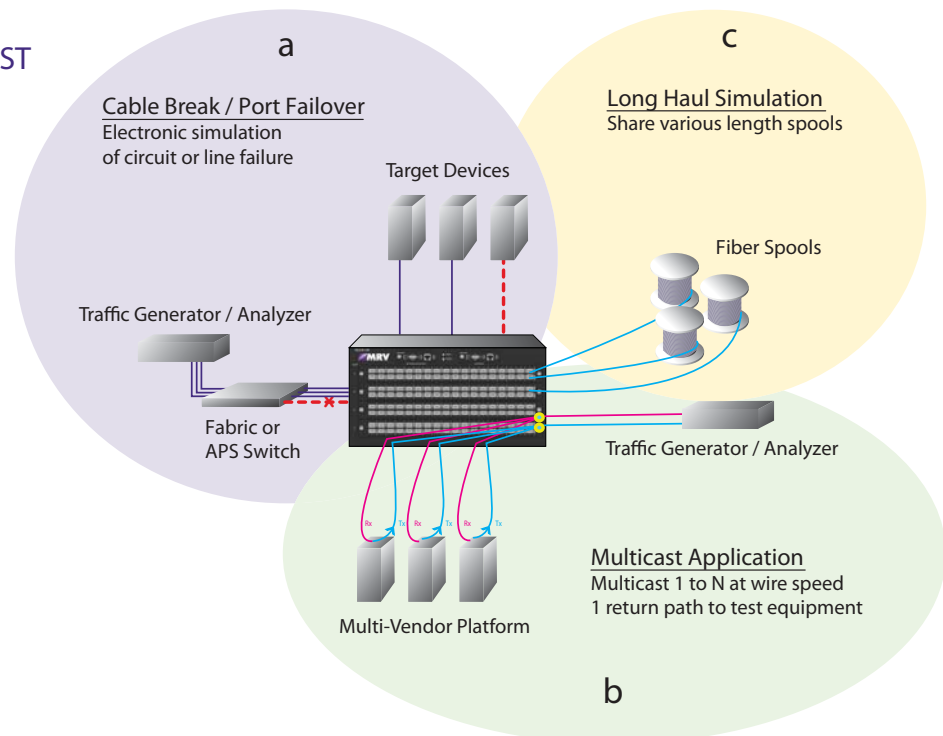


Figure 4 shows the Media Cross Connect being used to perform a variety of network simulation tests for use in validation or interoperability labs.

Applications

The flexibility of the Media Cross Connect makes it suitable for an extremely wide range of applications. Any area where test cases or configurations are repeatedly performed can benefit by deploying the Media Cross Connect. Some examples include testing new products in a development lab, performing regression tests in a software lab, simulating real-world problems in a customer assurance or escalation lab, validating operation of products in an interoperability lab, and even demonstrating product capabilities in a training lab or demonstration environment.

a. Cable breaks, hard failovers, or circuit failures can be simulated much more accurately, consistently, and repeatably using scripted commands than with manual cabling methods. Cable connects and disconnects can be simulated with rates in 1ms increments or greater. Depending on the protocol, the Media Cross Connect may discontinue frame transmission in a hard failover situation.

b. A port can be configured to multi-cast (broadcast) to many ports. This function is useful in such applications as using a traffic generator to perform stress tests on a network element. Instead of performing the tests serially, the generator port can be configured to broadcast the test patterns to many ports for simultaneous testing.

c. The devices connected to the ports and mapped to network equipment could use spools of fiber for distance simulation testing eliminating the cumbersome task of moving spools or equipment to simulate various link distances.

These applications dramatically reduce the number of expensive test sets and network devices required to support the lab environment.

In addition, the network simulation application of the Media Cross Connect makes it a perfect candidate for a customer assurance or escalation lab. Common field configurations and troubleshooting tests can be scripted and repeated to ensure a uniform and efficient means of solving customer issues.



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Conclusion - Setting the Stage for the Next-Generation of Lab Management

Media Cross Connects simplify lab management by turning the process of changing network connections by hand into a software process whereby network configurations can be stored electronically and recalled as needed. By extension, the chances of inducing configuration errors are reduced and the consistency and repeatability of testing is improved.

Through the automated scripting capabilities of a Media Cross Connect more efficient use is made of lab equipment and a test engineer's time is made more productive. When no one is needed to manually

alter network connections during or between tests, it becomes possible to queue a series of tests resulting in a true lights-out environment. The use of available time and existing resources is maximized.

Ultimately, the return on investment justifies a Media Cross Connect. In this context, the total impact a Media Cross Connect has on the bottom line is nearly immeasurable. The benefits of faster, more complete and predictable test execution ripple throughout the entire organization. Timely development and release of quality products or solving customer problems in rapid timeframes positions your organization for the responsiveness necessary in today's competitive business environment.

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