

Test Lab Automation Simplifies Testing of Increasingly Complex Wireless Systems

■ By Roberta Gonzalez, EdenTree Technologies, Inc.

Building a test lab for a wireless networking environment isn't for the faint of heart. Most obviously, the complexity of testing new wireless technologies, products, systems and services for performance, functionality, compliance and interoperability increases with every standard upgrade or new end-point release.

In addition, design teams and test teams are increasingly distributed across geographically diverse regions, severely limiting their access to expensive test equipment that may be limited to a central location. Add to that the time-sensitive nature of the tests they perform when working with a rapidly shifting landscape of emerging wireless technologies.

The Result?

Wireless equipment and services test lab managers face a host of challenges in meeting the demands placed on their test environment. Not the least of these are the rapidly escalating costs to purchase and maintain test equipment and the significantly heavier workloads placed on today's test lab personnel. At the same time, test lab budgets have been flat, and lab managers are being asked to do more with fewer resources.

Test personnel are forced to keep the costs of testing down, even while facing the reality of constantly changing sets of devices that often require frequent set up and tear down of test beds.

Test lab automation has been a solution that key wireless and mobility manufacturers and service providers are moving toward to cope with the complexity of testing today's wireless design.

To address these challenges, test labs are turning to automation, developing test scripts to automate the testing that occurs on any given test bed. While automated test scripts can dramatically improve the speed of the overall test process compared to manual testing, many challenges in the wireless test lab are not addressed by scripts. Test scripts are generally tied to a specific physical configuration of devices and rely on a particular physical test bed to be available. As such, they do not solve the problems of:

- The time and labor wasted on tedious recabling and rebuilding of test beds in between tests, which is estimated to consume as much as 25% of a test lab's human resources.
- Expensive and dedicated test equipment that could be better utilized if shared by multiple users.
- The need for remote user access to lab resources.

Now, savvy managers have started taking automation one step further by automating the physical layer of their test environments. Because wireless environments can potentially encompass a broad range of equipment with a variety of physical interface types — from T1/ E1 to Ethernet to ATM on

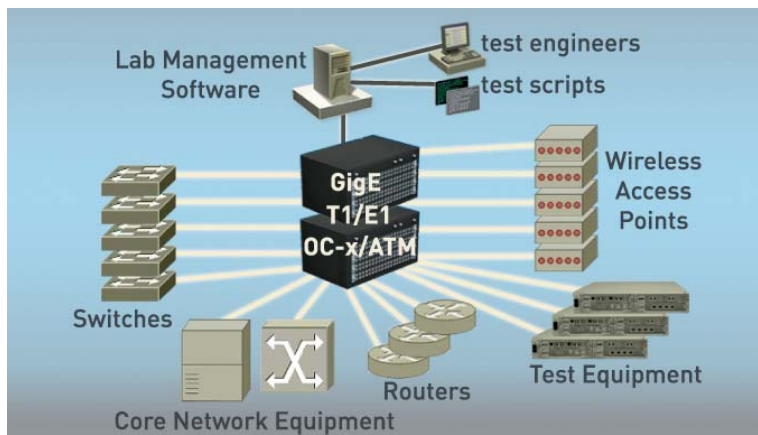


Figure 1. An automated lab allows for dynamic configuration of test beds and sharing of equipment.

the wired side — physical layer automation can provide dramatic improvements in most wireless labs. This article outlines developing such an environment for a wireless lab.

Fundamental Shift

Wireless test labs need to be not only readily accessible by local and remote users, but easily re-configurable so as to minimize wasted time and manpower on re-cabling and reconfiguring test beds. The automation of the physical layer accomplishes this

of the illustration). The lab management software controls the layer one infrastructure while adding a layer of abstraction that allows users to easily work with the end devices to build and control test topologies either graphically or through script commands.

A WLAN test bed, as an example, may include core routing switches and routers, in addition to a variety of Ethernet switches, wireless access points and mobile devices. All the devices with wire-line interfaces, along with test equipment, are con-

What else should you Look for when Choosing Lab Management Software?

- Tight integration with a variety of third-party physical layer switches that provide all required switching features and capabilities.
- An enterprise-class application with an easy-to-use GUI for discovering available devices, designing, organizing and sharing test topologies, and manipulating devices and connections during tests.
- User administration with access con-

A critical aspect of deploying an automated lab environment is choosing network lab management software that provides the control, accessibility, security, and ease-of-use features required by all stakeholders and users of the lab.

by introducing a fundamental shift in the architecture of the test lab. Most notably, it calls for deploying physical-layer switches that serve as interconnects between the various test equipment and devices and systems under test. The physical-layer switches are managed by software, allowing test topologies to be dynamically configured as they are needed.

In this arrangement, the physical-layer switches, which may be OEO (Optical-Electrical-Optical) matrix switches, OOO (all-optical) switches, or other copper or fiber cross-connect devices, serve the function of patch panels or direct connections between devices, except that patching is controlled via software instead of manually.

In these automated labs, test gear and devices and systems under test remain permanently connected to the physical-layer switches. Lab personnel use software to dynamically reconfigure the connections between the devices, either using a graphical user interface (GUI) or commands that can be integrated with existing test scripts.

In operation, this scenario not only allows instantaneous configuring of test beds, but it permits creating multiple test beds in parallel. It also gives off-premises developers and partners access to review test parameters or to set up and run their own tests.

Lab Automation for Wireless Environments

Figure 1 illustrates how a lab management software solution provides automated operation of physical-layer switches (in the center

nected to the lab automation infrastructure, allowing for dynamic reconfiguration of the test bed and leverage of the test equipment among multiple tests.

As with any major IT undertaking, automating the lab should begin with an assessment of the lab environment. This assessment meets two key business goals. First, it provides the underlying business case for the automation project. Second, it should produce an inventory of the lab's resources, pinpointing the number and types of devices in the lab, and how those devices are used and by whom.

With the assessment in hand, lab managers can then decide where automation of the lab's physical infrastructure can help the most and determine which physical layer switches to deploy. When assessing physical-layer switches, lab managers should consider the types of devices and systems under test, the number of ports they need to interconnect, data rates and interfaces in use, the any-to-any capabilities the lab requires, and the type of cabling (i.e., copper or fiber or a combination) in use.

A critical aspect of deploying an automated lab environment is choosing network lab management software that provides the control, accessibility, security, and ease-of-use features required by all stakeholders and users of the lab. The lab management software vendor should work with you to assess your lab and recommend the most appropriate and cost-effective physical-layer switches for your needs.

controls, roles, privileges, and priorities that allows you to optimize resource sharing as well as security, ensuring that all users and groups have expected and appropriate access to lab resources.

•Sophisticated scheduling that provides centralized reservations of lab resources with contention management, prioritized queuing, recurring reservations, and event notifications.

•A fully featured API, such that the system fits seamlessly into your existing test environment and integrates with any test scripts and automation tools you utilize.

By simplifying the set up and reconfiguration of test beds, physical-layer automation dramatically shortens test cycles, whether used in tandem with test automation or in manual test environments. The results of software-controlled dynamic physical configurations are increased test velocity, increased equipment sharing, and remote control of physical test beds.

About the Author

Roberta Gonzalez is vice president of marketing for EdenTree Technologies. The company develops connection management and automation solutions designed for the network and lab environments of network equipment manufacturers, service providers and enterprises. Gonzalez can be reached at (818)324-8679; rgonzalez@edentreetech.com.