

Increasing Productivity by Adopting Testing Best Practices

As network support organizations look to improve efficiency, they can take a page from leading service providers by standardizing on a thorough set of tests that every technician uses to solve connectivity problems. Fluke Networks developed an approach that even small organizations can scale to their network. As a result, novice technicians can solve problems as fast as experts, experts can solve them even faster, and the organization can realize a payback in about one month.

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Ad-hoc Testing Wastes Time

Much of network operations require little human attention. Automated network management systems keep an eye on the operation of the network by watching key statistics and comparing them against limits. If, for example, a device takes too long to respond, or a network link carries too much traffic, the NMS notifies the staff to take appropriate action.

Some network operations tend to be less automated, especially installation and troubleshooting. In many cases, testing is minimal, for example, technicians may only look at a link light to ensure connectivity. Problem solving is dependent solely on the skill of the technician who can get problems solved relatively quickly if the skill level is high—or drag on if it's not. Even expert attempts may be misguided if a technician doesn't fully understand the network connectivity problem. When someone says "that should solve it", do they know the problem will be solved by the fix, or are they just playing percentages?

An ad-hoc approach to network troubleshooting can result in time wasted as multiple fixes are applied, and problems escalate to higher skilled engineers. The associated reduction in user satisfaction does little to help the reputation of the IT department.

Standardizing Tests Saves Time and Yields Better Outcomes

Years ago, telephone companies faced similar issues, on a much greater scale. With thousands of technicians, the skill levels varied greatly. And with millions of customers, the inefficiencies added up to huge wastes of time, money and a lot of dissatisfaction. The biggest waste was callbacks where a second or third visit was required to solve a problem that should have been solved the first time.

The solution was straightforward. First, the telecommunications companies worked with their top technicians and engineers to develop testing best practices. By developing a set of tests to anticipate all possible problems, they were able to ensure all issues were uncovered the first time. Second, the set of tests was standardized into Standard Operating Procedures (SOPs) technicians were expected to follow every time they were on a job. These complete, repeatable procedures allowed carriers to solve problems faster, save more money, and increase customer satisfaction. Even in organizations without thousands of technicians, reducing waste and increasing customer satisfaction are still top priorities.

What's in a Complete Network Connectivity Test?

For nearly 20 years, Fluke Networks built and shipped Ethernet test sets—we have more in use than any other manufacturer. Working with thousands of customers as well as technology developers worldwide, provided us with unmatched experience in Ethernet troubleshooting. Since we know networks, we've determined that a complete SOP for testing an Ethernet port would include the following.

1. Cable

Cabling is one of the most common causes of network problems. It's one of the few parts of the network that end users can get their hands on, so it's not surprising things go wrong. Cables get caught in chair wheels and jacks get pulled out of walls. Users bring cables from who-knows-where and try to use them. Patch cords get routed around sharp corners on file cabinets that eventually cut through them. It's essential to test in order to find these and the myriad of other cabling problems.

2. Link / Speed / Duplex

Ethernet to the desktop now runs at three different speeds (10 M/100 M/1 Gig) and three different duplex settings (half/full/auto). Depending on how the switch and PC are configured, one of three things can happen. First, everything works perfectly – the most common scenario. Second, it doesn't work at all – may take a while to solve, but will eventually be fixed. Third, the Ethernet works to a degree. This error is the most frustrating and may not cause noticeable symptoms until something changes, such as adding a Voice over Internet Protocol (VoIP) phone or increased traffic levels – at which point the network becomes very slow. This problem can stump even experts for days so understanding how these parameters are set is critical.

3. Mislabeled cable

The most common cabling error isn't a broken one, it's a mislabeled one. If the user is connected to the wrong switch, port, or VLAN, he/she may experience a total breakdown in communication or just suffer with slow response times.

4. Network services

Being unable to access network services such as DNS or DHCP from the user's desktop can result in symptoms ranging from slow performance to a total lack of communications. A quick test of these services can rule out these problems.

5. Power over Ethernet

The number of devices powered by Ethernet is exploding as companies deploy technology to support VoIP phones, security cameras, and wireless access points. If a device doesn't power up, is the problem the cable, the device or the switch sourcing the power? And what if the power source is marginal because the cable is bad or too long or the switch is simply overloaded? Testing the PoE can answer these questions.

6. Connectivity to key resources

Once all the basics in 1-5 are addressed, the final issue is whether the network will carry the user's traffic to the places it needs to go. For example, can the user reach the corporate intranet, email servers, cloud? Or is something blocking access?

Standardized Testing in the Real World

A complete set of tests to handle these issues would greatly increase troubleshooting effectiveness but at a steep cost in terms of time. An expert user with a laptop requires around five minutes to complete these tests¹. He/she would also need additional equipment like a cable and PoE tester. Less expert users take longer and often don't know how to complete some of these tests. The time and complexity makes it highly unlikely that a field technician could perform a complete test without taking shortcuts to save time. This doesn't even take into account a technician's expertise level.

But what if all these required tests could be done faster than a technician could do a single one? The LinkRunner™ AT Network Auto-Tester performs all six of these essential tests in ten seconds—less time than it takes to open a laptop and start just one of the applications needed to perform a complete test. LinkRunner AT also includes specialized hardware that tests functions—signal level and PoE—which aren't possible for even the most expert technician.

Cable Tests – The LinkRunner AT checks connection continuity and displays the length, even when connected. If a problem with the cable is discovered, the graphic display clearly shows its nature.

Link / Speed / Duplex – The LinkRunner performs the most thorough test of the physical connection available. Not only does it verify the actual connection status, speed, duplex and signal level, but also reports on the advertised settings from the switch.

Mislabeled Cables – Displays the name and IP address of the nearest switch, slot and port that the LinkRunner AT is plugged into.

Network Services – Verifies availability and performance of DHCP and DNS servers.

Power over Ethernet – Verifies you are receiving the required PoE power and voltage to power your PoE-driven devices. The LinkRunner TruePower™ PoE loading draws actual power (including the new class 4 setting of 25.5W) to verify that your PoE-driven devices receive the power required to function properly.

Connectivity to Key Resources – Ensures key applications are available from the network port by performing a TCP port open or ping. The port open test is more comprehensive than a ping, which

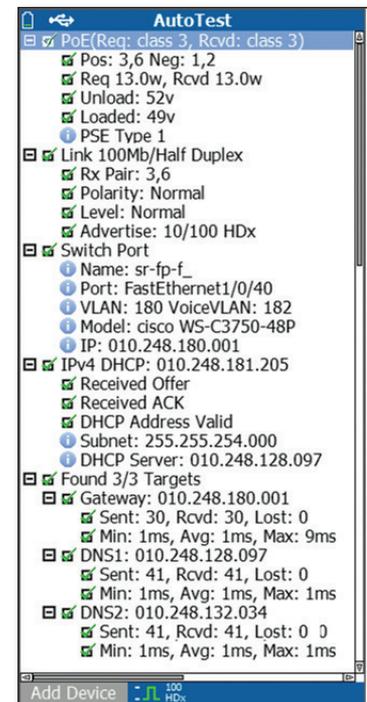


Figure 1. The LinkRunner AT performs a thorough autotest of essential network connectivity functions and displays the results in a simple to understand pass/fail manner. (Scrolling screen shown.)

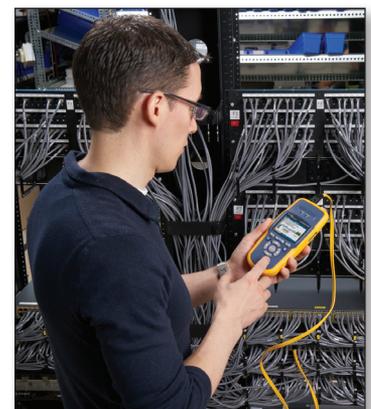


Figure 2. The LinkRunner AT's small size means the technician can find problems in less time than it takes find a place to park his laptop.

can be blocked by firewalls, dropped on busy links, or ignored by the target for security reasons. This test can also determine if the application is running on the server.

Detailed results for each test immediately point out what the problem is, making it clear to the technician what needs to be done to remedy it. Since the test is fast and easy to run, it can be run again after a repair to ensure there are no additional problems, or the fix did not somehow cause another problem.

In addition, these tests can be customized for your requirements, and multiple tests can be defined (for example, for different sites or drop types such as a PC, VoIP phone, access point, or security cameras). Test results can also be stored for proof the job was done right or collaboration with experts for problems that the technician is unable to solve alone.

Payback in Just Over a Month

The value of a complete, repeatable test can be calculated in a straightforward manner. The two key variables are how much time the test saves, and how often it's needed. The latter variable is specific to an organization and would be affected by the network's size, the number of moves, adds, and changes, and installation of new technologies—as any of these variables grow so do the number of tests. A project, such as deploying new VoIP phones, or moving a department results in dozens of tests per hour. In a recent Fluke Networks research study, network professionals indicated they spent about 40 percent of their time away from their desks in support of networks and users. The ROI chart below assumes a technician is testing a network drop four times each of those hours.

How much time can a structured approach save? The upper number is very large—the LinkRunner AT discovered problems in a ten-second autotest that stumped customer technicians for weeks. The time saved also depends on the technician's skill level. An expert can diagnose simple problems almost as fast as the LinkRunner AT. Other problems, however, such as PoE issues, would be almost impossible to correctly diagnose without test equipment. For our calculations, we use the difference between the LinkRunner AT's AutoTest and the five minutes it would take for an expert to replicate those tests using a laptop and other basic tools.

As you can see, even with these conservative estimates, the product will pay for itself in a little over a month. What's not included are the reduction in callbacks and the enhancements to the productivity of the users who will benefit from reduced resolution time (which may be several times larger than the amounts calculated here).

Time saved per drop	4.83 minutes
Percentage of time installing/troubleshooting	40%
Hours spent installing/troubleshooting	16 per week
Drops tested per hour away from desk	4 per hour
Weeks per year	50
Testing Time saved	258 hours
Hourly Technician Cost (Loaded)	\$65.00
Annual Savings	\$16,576

Figure 3. Estimate of annual savings from LinkRunner AT.

For more information please visit: www.flukenetworks.com/LinkRunnerAT

Contact Fluke Networks: Phone **800-283-5853** or Email: info@flukenetworks.com.

Fluke Networks
P.O. Box 777, Everett, WA USA 98206-0777

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¹ See video at www.flukenetworks.com/LinkRunnerATVideo