

31.3% REDUCTION IN FALSE DISPATCHES AS A RESULT OF RESOLVING LTS TEST FAILURES

Tollgrade's DigiTest® Centralized Test System Can Lower LTS Replacement Costs By 25%

With most RBOCs shooting trouble on 3% of their lines monthly – and having dispatches required on half of them – maintaining the ability to remotely test those lines is critical. In many cases, your ability to accurately test your network, and subsequently fulfill customer service obligations more efficiently, will distinguish you from your competition.

The Loop Test System (LTS), introduced by Lucent Technologies, Inc. in the early 1980s, is the primary hardware platform used by the RBOCs today to test customer lines. **When an LTS fails, companies are, in essence, "blind" in their ability to test subscriber lines in that office,** leaving them with only one option – dispatching on every customer trouble call until testability can be restored.

This legacy hardware is experiencing more frequent failures, resulting in the RBOCs not being able to run automated tests on customer troubles. In March 2002, the LTS was relegated to the status of Discontinued Availability (DA) by Lucent. Degrading performance, scarcity of replacement parts and diminishing availability of technical resources can result in longer outages and extended repair cycles for troubled LTSs.

THE POTENTIAL IMPACT OF FALSE DISPATCHES

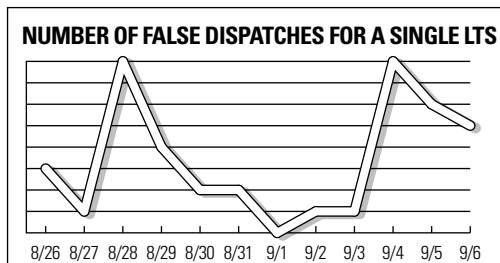
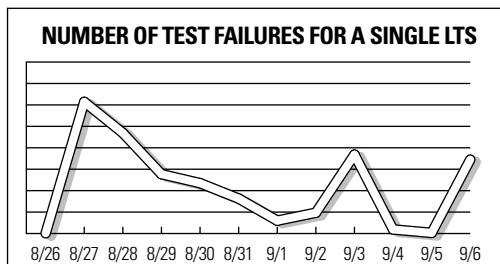
During tough economic times, reducing expenses is every provider's objective. Eliminating unnecessary dispatches is one good place to cut costs.

By applying the typical 3% trouble call rate to a 50,000-line office, the provider would be faced with responding to 1500 troubles per month. And, while dispatches are usually required for half of them, an LTS failure would require dispatches to every trouble – a potential of 750 false dispatches per month. At \$80-150 per dispatch, the resulting monthly financial impact of those false dispatches would be \$60,000 to \$112,500 in that one office alone.

If left unresolved, the annual impact could reach up to \$1.35 million. Explode that across the entire RBOC footprint, and the costs could be significant.

A STRONG CORRELATION BETWEEN FAILED TESTS AND FALSE DISPATCHES

As part of a study performed in November 2002, Tollgrade Communications, Inc. analyzed testing and dispatch data for ten sporadically working LTSs in a large incumbent service provider's network. The results showed a strong correlation between failed tests and false dispatches (see below). As the number of failed LTS tests went up, the number of false dispatches also increased. In fact, when false dispatches were traced (by telephone number) back to the associated test request over the study period, Tollgrade recorded that **31.3% of the false dispatches were due to failed LTS tests.** At \$80-150 per dispatch, false dispatch costs are formidable.



A comparison between the number of test failures and false dispatches for a single LTS.

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A VIABLE LTS REPLACEMENT AND MORE

Companies simply cannot afford the cost of false dispatches and bear the risk of losing customers due to failing test equipment. The only sustainable solution to this problem is to replace legacy hardware with newer test systems that provide the same test functions of the LTS while also providing a simplified upgrade path as the network evolves to support new technologies and services.

The Lucent-recommended LTS replacement product is Tollgrade's DigiTest® Centralized Test System. DigiTest is approved for use in each RBOC and is **the only test system fully backward compatible with the LoopCare™ Test OSS**, already widely in use in all of the RBOCs. LoopCare is responsible for hundreds of millions of automated tests on a majority of the more than 167 million ILEC subscriber lines each year.¹ In addition, DigiTest uses the same Operation, Administrative and Maintenance (OA&M) tools as the LTS, so **the same people that administer LoopCare today for LTSs can easily transition to manage DigiTest.**



LoopCare Test OSS

All things considered, this makes DigiTest a viable direct replacement for the LTS.

The DigiTest System is scalable, providing the ability to cost-effectively grow test systems as customer demand for other services grows.

For DSL, DigiTest can also detect load coils, measure loop length and predict bit rates.



DigiTest Centralized Test System

DigiTest utilizes Time Domain Reflectometry (TDR) and wideband noise measurements to detect and locate bridged taps, cross-talk, gauge changes and various loop faults. Add the benefits of a lower cost of maintenance and the ability to migrate to a more modern TCP/IP network architecture, and **DigiTest is an ideal replacement for LTSs that are beginning to show their age.**

The 50,000-line office LTS failure in the previous example, (with the \$60,000 to \$112,500 potential monthly impact) can be replaced with DigiTest for \$80,000 in hardware costs.

Replacing an out-of-service LTS with DigiTest, versus pulling an LTS out of storage and re-engineering it, can result in **up to 25% lower cost.** Shown below is a simple comparison of the estimated costs.

A simple comparison of the estimated cost to replace an out-of-service LTS with DigiTest, versus pulling an LTS out of storage and re-engineering it.

| | Move/Install Spare LTS* | Install DigiTest (configured for four No-Test Trunk [NTT] interfaces) |
|---|-------------------------|---|
| Material cost | \$0 | \$22,000 |
| Ship material to site | \$1,200 | \$50 |
| Engineer, install and turn up costs (including travel and expenses) | \$20,000 ² | \$3,200 ² |
| Annual circuit pack repair | \$4,000 ² | \$0 |
| Annual private line circuit | \$1,900 ² | \$0 |
| Access server port allocation | \$0 | \$200 |
| Callback line allocation | \$0 | \$200 |
| Engineering to remove LTS | \$5,200 ² | -- |
| Haul/disposal of old LTS | \$2,000 | -- |
| SUBTOTAL | \$34,300 | \$25,650 |
| | | 25% lower cost |

*Assumes spare LTS equipment is available.

¹ Note that the number of lines listed pertains to "ILEC" (which is a little broader than RBOC), as this is what the FCC tracks. Also note that the ILEC statistics represent 98% of actual ILEC lines, as carriers with less than 10K lines are not required to report. Data extracted from *Local Telephone Competition: Status as of June 30, 2002*, FCC Industry Analysis and Technology Division, Wireline Competition Bureau, December 2002.

² Estimates provided by an RBOC in March 2001 as part of a Tollgrade study on the comparative cost to replace LTS systems with DigiTest. The March 2001 study was subsequently used by the RBOC as part of a business case for the same subject.

LTS/DIGITEST TECHNOLOGY COMPARISON

Tollgrade's DigiTest System provides an LTS replacement solution that addresses today's needs while preparing service providers for tomorrow's growth.

| | Lucent LTS/DCTU | Tollgrade DigiTest System |
|---|---|--|
| Tests POTS | Yes | Yes |
| Tests wideband | No | Yes, with addition of DWU ^{††} |
| Tests for load coils | No | Yes |
| Enhanced loop length performance | Provides enhanced lengths for approximately 50% of loops (only some CPE and no mechanical ringers) | Provides enhanced lengths for approximately 90% loops (most CPE and all types of mechanical ringers) |
| Test traffic | Individual test times increase with simultaneous tests due to contention for shared common trunks (maximum three PMUs). | Individual test times are not impacted due to dedicated trunks. (Simultaneous test run up to 33% faster compared to the LTS.) |
| 5ESS trunk padding resistors | Required to limit test currents | Not required. Allows for improved measurements for loop length enhancement, load coil detection and resistive fault location |
| Communication architecture | Uses DCN (proprietary, centrally located BX.25 data switch), LCN (Datakit) or LTCN (TCP/IP-based) <i>NOTE: DCN has been DA'd by Lucent Technologies.</i> | Dial-up, or direct TCP/IP Ethernet (when equipped with Ethernet option or external access server) |
| Firmware upgrades | Not upgradable. <i>NOTE: LTS has been DA'd by Lucent Technologies.</i> | Downloadable from network |
| Configuration | Up to 128 circuit packs provide power and required functions for up to 16 test trunks and three test heads. | Integrated module with communications, test and access for one test trunk on a single pack |
| Rack space required | Full 7-foot bay | Two RU high per two No-Test Trunks (NTT), including air space |
| Power requirements | -48V DC power feed from CO battery, with 25 AMP fuse, to up to 14 large plug-in power supply modules that provide all the voltages needed by the LTS circuit packs. | -48V DC power feed from CO battery, with 3 AMP fuse, direct to the DMU with no external power supplies. |
| Scalability | Yes. Growth through addition of PMUs (up to three) and NTTs (up to 16) in large shelf additions | Yes. Growth by adding additional DMU shelves |
| Single trunk growth (EF&I) costs [†] | If additional PMU and NTT circuit is required, estimated \$60,000 | Addition of DMU into exiting chassis, \$8500. |
| Fail over capability | No. When an LTS common board fails, the office loses all test capability. | Yes, with DMU clusters. When one card fails, the remaining DMUs continue to function and manage the test load. |
| Technical expertise | Requires LTS-trained technicians to swap and troubleshoot the various plug-in boards | Automated sanity and modern plug-&-play technology with on-board diagnostics lead to easier troubleshooting and swapping of a failed unit. |
| Estimated hardware maintenance costs | \$4,000 per LTS (average four circuit packs per LTS per year need repairing at a fee of \$1,000 each) ² | \$0.00 during two-year warranty period. On average, \$200 per DMU after warranty |
| Average MTTR | two hours | <30 minutes |
| Cost of spares kit | Estimated \$70,000 ² | Estimated \$10,000 |

[†] Assumes spare LTS equipment is available.

^{††} Not through the switch.

Costs are as of June 2003 and are subject to change without notice.

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