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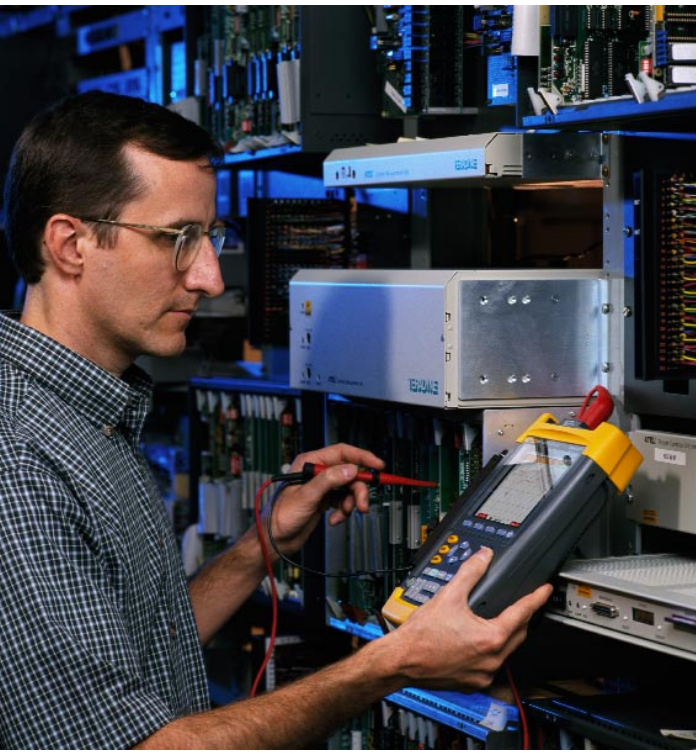
World's telecommunications network relies on razor-accurate test tools

Technology at Work



Making sure the world's telecommunications networks operate at peak efficiency is no small task, with almost a billion telephone lines stretched across the globe from Alaska to Zanzibar. Today's phone lines carry more information than they were ever intended to hold, as data streams now sandwich between voice communications to take advantage of every drop of bandwidth available. Yet the demand for more – more lines, more services, more capacity – continues to explode.

Enter Teradyne Corporation. Teradyne's Broadband Test Division qualifies and tests broadband services. Teradyne equipment and experts work with telecommunications service providers to maintain installed telephone networks, perform routine maintenance and diagnostics, and pre-qualify lines for additional levels of broadband service. Teradyne currently has more than 110 million access lines under test worldwide.

"The public switched telephone network now carries more data traffic than voice," said Joe Weadick, a Teradyne contract design engineer. "Traffic on the pubic switched telephone network is at a level it was never intended to handle. We're trying to get a lot more through those pipes than was ever intended."

Teradyne products allow service providers to find, diagnose and solve problems that impair maximum bandwidth capability.

"We can detect things that were once installed on phone lines to solve certain problems associated with voice traffic that now actually impair or limit bandwidth available for data traffic," Weadick said. "There are systems and workarounds that phone companies installed over the years to fix problems associated with voice streams that actually limit the bandwidth of what can go through the lines. That was advantageous before with voice traffic, but now it's not always advantageous with high-speed data traffic. Teradyne can detect and identify what's out there."

In addition, Teradyne can locate the source of a line problem. "If someone calls in and reports trouble on their line, the service providers use our equipment to run specific tests to isolate and characterize a fault," Weadick said. "Our system tells them whether the fault is on the customer's premises, somewhere between the central office and the customer's premises, or in the central office itself. That way the service provider knows where to send someone, if they need to send someone at all."

The service providers and Teradyne rely on the consistent accuracy of the Teradyne equipment, and accuracy requires constant vigilance. In the "noisy" environment of a central office, even the best equipment can pick up spikes and electrical noise.

"You've got hubs, you've got routers, you've got providers that co-locate their equipment in the central office," Weadick said. "There is the huge bank of batteries that the central office uses to provide electricity to the phone lines, in a massive battery room. There's a generator that kicks on periodically. There are all kinds of noise, spikes and signals that can be coupled into our equipment or anyone else's. It can damage the equipment or affect the equipment accuracy."

When Weadick encountered a noise problem during product development in just such an environment, he turned detective – in more ways than one.

Weadick set about to chart and monitor the effect of the electrical spikes on the new product's performance. He used a ScopeMeter® test tool from Fluke Corporation, a precision tool that essentially combines a high-powered digital multimeter and oscilloscope in one hand-held instrument. Weadick was able over the course of a month to automatically capture and record the duration and frequency of each waveform, capture that information in the field and then download it to his PC for comparison and analysis.

"I didn't know if the situation I was seeing was tied to something related to the central office or if it was related to the specific hardware we were developing," Weadick said. "We use electromechanical switching relays in our equipment to enable various measurements. We generate signals and send them down the line under test. We also receive those signals back, perform signal analysis and then characterize the line condition. My analysis ended up identifying the effect of ambient noise on our product."

"Using the ScopeMeter and my PC, I could bring multiple waveforms into one window on my PC and save that group as one individual file," he said. "Then I could go capture another group of waveforms in another window and save that to reflect whatever category I had changed."

In November, Fluke introduced the ScopeMeter 190C Series test tools, featuring a full-color display, particularly fast screen update rate and enhanced troubleshooting capabilities. The full-color display is particularly advantageous when analyzing multiple subtle waveform differentiation.

To Weadick, the hand-held ScopeMeter's portability offered a particular advantage.

"I was working between two locations," Weadick said. "Portability was important, as was battery power. If I didn't have a laptop handy, I could just disconnect the meter, have it working on battery power, return to my desk and unload everything into my PC."

Weadick's persistence paid off. He tracked down the subtle noise source and solved the problem. To solve his problem, Weadick used a handheld 190 Series ScopeMeter from Fluke Corporation.

In a world run by the communications that course through the world's telephone lines, the determination it takes to solve such a complex noise problem is a bottom line benefit difficult to overemphasize. "It means better products introduced to market and greater efficiency on the job," Weadick said. "And that cascades right down to the bank."

Fluke. *Keeping your world up and running.*

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