

Diagnostic Capabilities of the CrossPATH*

Application Note **Overview**

Remote cell sites can be located hours away from the nearest technicians, and every truck roll is expensive. Intermittent problems often result in “no trouble found” and can lead to multiple truck rolls to diagnose a single issue. Portable test equipment can be very expensive and must be relocated with each troubleshooting event.

Integrating test capabilities into remote cell site equipment can greatly reduce T1 maintenance costs. The more information that can be gathered remotely, the easier it is to diagnose problems. This application note addresses diagnostic capabilities available in the CrossPATH to ease troubleshooting including:

- Loopbacks
- BERT testing
- Remote testing
- Performance reports

Loopbacks

Loopbacks are a vital tool in diagnosing T1 physical layer problems. Loopbacks allow the technician to sectionalize the network to pinpoint failures or degrading segments. Once a loopback is set, a known test code can be sent and measured to determine the performance of the individual section under test.

Two different types of loopbacks are supported in the CrossPATH: line and payload loopbacks (see Figure 1). A line loopback will loop the incoming signal back to the network and does not pass through the framer in the CrossPATH. This allows the network line to be tested.

A payload loopback uses the data received and loops it back to the transmit side of the framer, after correcting bipolar violation (BPV) errors. In extended super frame (ESF) mode and the framing pattern sequence (FPS), the CRC-6 calculation and facility data link (FDL) bits are not looped back. Instead they are corrected and reinserted by the framer. Timeouts can be set to automatically reset after a specified test interval is selected to ensure that an interface is not inadvertently left in loopback.

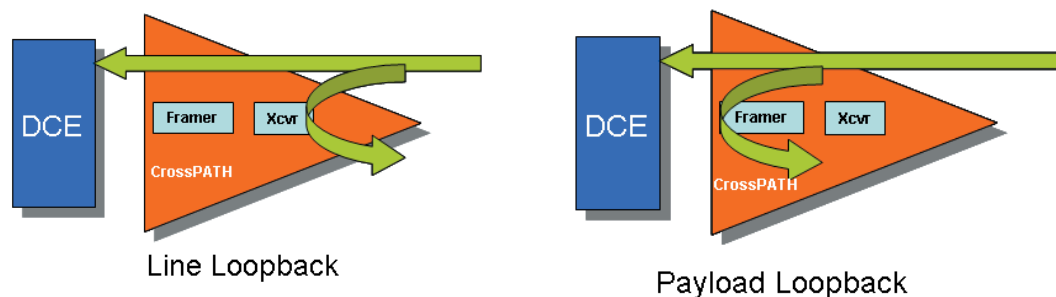


Figure 1: CrossPATH supports line and payload loopbacks to help isolate network issues.

* CrossPATH refers to CrossPATH 3G and CrossPATH 4.

CrossPATH has integrated CSUs on all T1 interfaces. This enables CrossPATH to respond to standard in-band T1 loopup and reset codes as well as T1.403 out-of-band codes. The CrossPATH also generates loop codes to loop up the far end of the link. CSU loopbacks can be used to allow the codes to be sent to other downstream CSUs.

BERT testing

In telecommunication transmission, the Bit Error Rate (BER) is the percentage of bits that have errors relative to the total number of bits received in a transmission, usually expressed as ten to a negative power. For example, a transmission might have a BER of 10 to the minus 6, meaning that, one bit out of 1,000,000 bits transmitted was in error.

The CrossPATH has integrated BERT test capabilities (see Figure 2). A built-in Quasi-Random Signal (QRS) generator can send a test code out on a T1 interface and measure the returning signal for errors. The user can also insert a single bit error or specify a fixed amount to verify link performance. This allows for quick BER tests to be run over any T1 interface without the need for external test equipment and DSX jacks, eliminating the need for technicians to carry portable test equipment.

The screenshot shows two panels for BERT testing. The left panel, titled "QRSS BERT Test", includes a "BERT Test Timeout" dropdown set to "5Min", a "BERT Test expires in" timer showing "0days, 0h:4m:59s", a status indicator "BERT Test Is Sending QRSS", and a "Deactivate" button. The right panel, titled "BERT Monitor & Error Insertion", includes a "Receiving QRSS Pattern:" dropdown set to "Yes", a "Receiving Bit Error Counts:" field showing "0" with a "Reset Counter" button, and a "Bit Error to Insert" field showing "1" with an "Insert" button.

Figure 2: The CrossPATH contains easy-to-use testing tools for integrated BERT test capabilities.

Remote testing

The CrossPATH features a browser-based Graphical User Interface (GUI) to simplify network management (see Figure 3). The integrated router allows a wide variety of remote access to all the capabilities of the CrossPATH. The diagnostic capabilities can be performed locally as well as remotely. This offers huge savings by minimizing network downtime and the costs associated with truck rolls.

The screenshot shows a GUI with four panels. At the top, it displays "Alias: BTS 1" and "Circuit ID: 123456789". The "Near End Loopback" panel includes a "Loopback Config" dropdown set to "None", a "Loopback Timeout" dropdown set to "5Min", a "Loopback expires in" timer showing "0days, 0h:0m:0s", and a "Set" button. The "Far End Loopback" panel includes a "Loopback Request" dropdown set to "LoopDown", a "Request Timeout" dropdown set to "5Min", a "Request expires in" timer showing "0days, 0h:0m:0s", and a "Send" button. The "QRSS BERT Test" panel is identical to the one in Figure 2. The "BERT Monitor & Error Insertion" panel is also identical to the one in Figure 2.

Figure 3: The GUI enables point and click setup of near and far end loopbacks.

Performance reports

In addition to real-time status and alarm indicators, the CrossPATH provides a wide variety of performance reports for all T1 interfaces. Historical performance reports based on T1-403 and T1-231 are available in 24 hour summaries and as detailed 15 minute increments for the current 24 hour period with hourly breakdowns for up to 7 days of data. The DS1 signal level is constantly monitored and recorded and can be viewed in historical reports to assist in predicting impending outages. By analyzing historical performance data, proactive testing and maintenance can be performed. Figure 4, for example, shows the daily summary of T1-1. A few days ago, this circuit started to experience errors on a T1, but the errors are not severe enough to lose the circuit. CrossPATH reporting proactively provides maintenance before this T1 goes down.

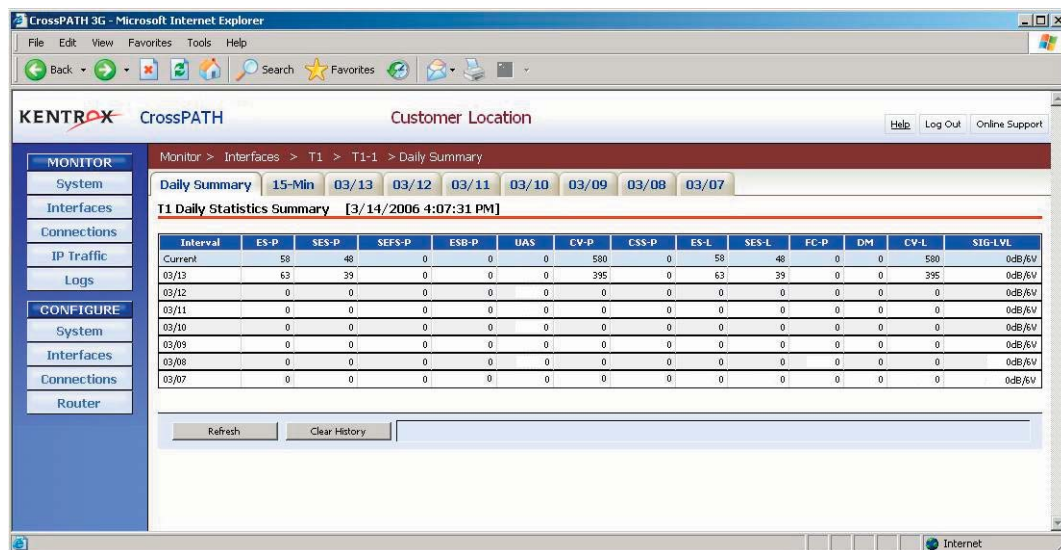


Figure 4: Reports show degrading T1 line allowing for proactive maintenance to be performed before service is lost.

Summary

Kentrox is an industry leader in quality network access products and is known for providing solutions that are easy to install, simple to manage, and meet the growing needs for both wireline and wireless access products. The diagnostic capabilities integrated into the CrossPATH provide technicians easy access to maintenance and troubleshooting data for remote cell sites. By gathering more information remotely, it becomes easier to diagnose problems. Additionally, the CrossPATH provides cost savings by reducing or eliminating truck rolls and providing the tools to minimize cell site downtime.

04-03-010 5/06 Copyright © 2006 by Kentrox, LLC. All Rights Reserved. Kentrox and CrossPATH are registered trademarks of Kentrox. All other products are trademarks of their respective owners. Information published here is current as of the date of publication. You may verify information by contacting our headquarters in Hillsboro, Oregon. Kentrox is an Equal Employment Opportunity/Affirmative Action employer.

Kentrox
 20010 NW Tanasbourne Drive
 Hillsboro, OR 97124
 Phone 503-643-1681
 Toll Free 800-733-5511
 www.kentrox.com