

APPLICATION NOTE



USING THE BASE CAPABILITIES OF THE KE3400 DSL INSPECTOR TO IDENTIFY DSL PERFORMANCE PROBLEMS

THE BASIC DSL SERVICE TEST

The KE3400B DSL Inspector is a performance tester for broadband digital subscriber lines (DSL). Its fundamental job is to exercise the DSL service to determine what data transfer speeds and quality are being delivered to subscribers.

The best information about the DSL link is determined by connecting to the service and the main statistics are as shown in Figure 1. In this screen it is possible to see whether the DSL is providing the data volume that is

needed. This method is known as double-ended loop testing or DELT.

USING “Bins” and “Hlog” SCREENS TO SPOT TROUBLE

Sometimes there are problems with the data speed or consistency. The most likely causes of reduced bandwidth and interference are:

- Bridged Taps on the Line
- Bad Line Balance
- Opens or Corroded Splices in the Line

Often these issues can be identified using the KE3400 Bins, Hlog or Dr DSL (optional) functions after connecting to the DSL service.

Bins: The data capacity of each tone in the multi-tone broadband channel can be seen in the test set Bins screen. Figure 2 shows a measurement with areas of lowered performance. This is usually a sign of interference from radio transmitters or adjacent cables. Determining the affected frequency bins helps you identify suspects. Poor line balance is often a factor.

Hlog: The frequency response of the broadband channel is shown in the test set Hlog screen as in Figure 3. A normal pair of twisted wires has a smooth decline in signal level as it runs out to the customer’s location. Corroded splices or bridged taps on the pair distort the Hlog curve as shown and result in lost capacity.

It is best to perform these tests both from the customer toward the network and from the network toward the customer.

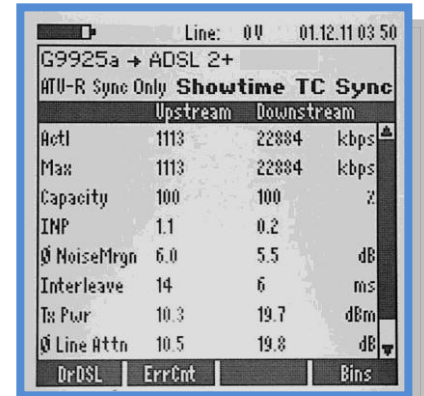


Figure 1 – A Typical Main Statistics Screen

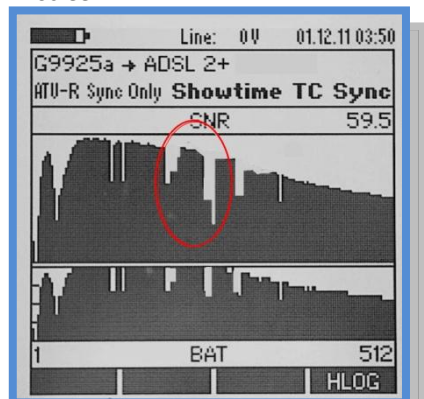


Figure 2 - The "Bins" Screen Makes It Easy to See Under-performing Bands.

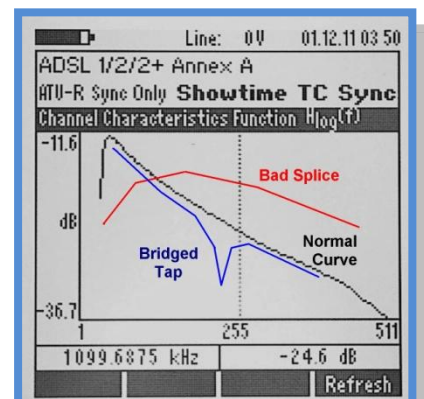


Figure 3 - A Fairly Smooth “Hlog” Plot is a Good Sign.

Dr DSL EXPERT SYSTEM ANALYSIS

When the KE3400 is equipped with Dr DSL analysis software the DSL line conditions undergo a digital “expert system” evaluation that produces four sets of information.

- Fault Detection
- Loop Estimation
- Rate Analysis
- Spectral Interference

Fault Detection – The line conditions are compared to the behavior of lines with a variety of known fault characteristics. Common problems are listed in plain English along with a confidence factor on the result. Figure 4.

Loop Estimation – In the course of analyzing the loop, Dr DSL is able to use its broad loop characteristic data base to provide an estimate of the tested line’s physical nature. Figure 5.

Rate Analysis – As a check against other indicators, Dr DSL provides an estimate of the data capacity that might be recovered by improving the loop conditions. Figure 6.

Spectral Interference – Crosstalk and external radio (RF) interference are projected in the spectrum screen. Figure 7.

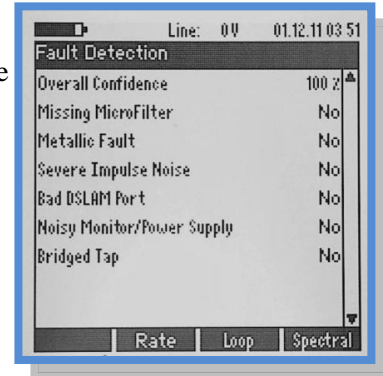


Figure 4 – Dr DSL Fault Detection Results are in Plain English.

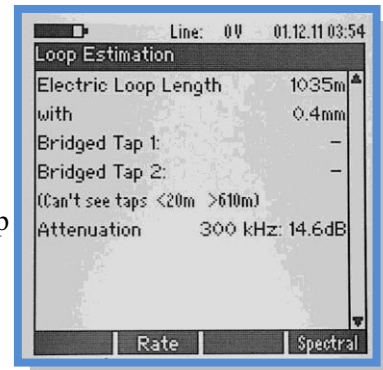


Figure 5 - Loop Estimation Gives the Physical Character of the DSL.

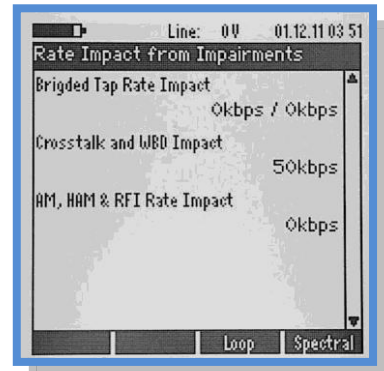
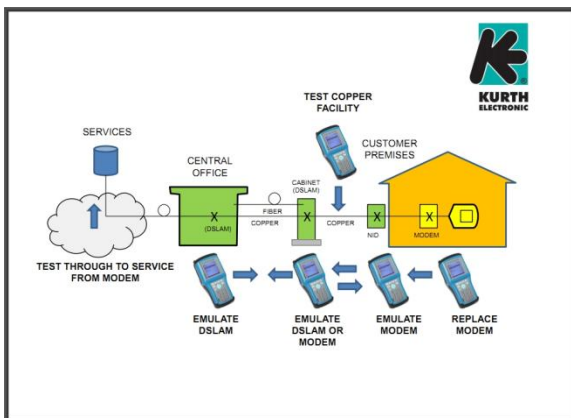


Figure 6 - Rate Impact Prioritizes the Improvements That Could be Made.



The KE3400B can be used to test from any point in the network, but one of the most effective test points is the customer premises looking both toward the modem and to the DSLAM.

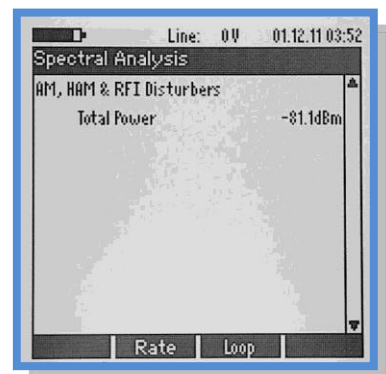


Figure 7 - Dr DSL Quantifies the Possible RF Interference It Found.