

## Understanding DSL Test Results Using the SmartClass™ TPS



The JDSU SmartClass TPS tester is the ideal tool for technicians who install, troubleshoot, and maintain Triple-Play services.

### Test Challenge

Understanding Digital Subscriber Line (DSL) test results is fundamental for field technicians who must rate the quality of service (QoS) and reliability of a tested DSL line. Copper loops carrying DSL signals can be exposed to many elements and external factors that impact QoS, including attenuation, environmental stress (such as changing temperature and water ingress to the cable), and noise inside the cable bundle.

### Addressing the Challenge with SmartClass TPS

DSL rates depend on received signal power in comparison with the received noise power. The difference between the two is the signal-to-noise ratio (SNR). The greater the SNR value per tone, the more bits that can be carried on that tone (and the better the DSL rate), as Figure 1 shows. Cable attenuation drives the received signal power, and longer loop lengths produce higher cable attenuation—meaning less received signal power and a lower SNR. The maximum achievable DSL rate (max rate) is a result of attenuation driving the SNR values.

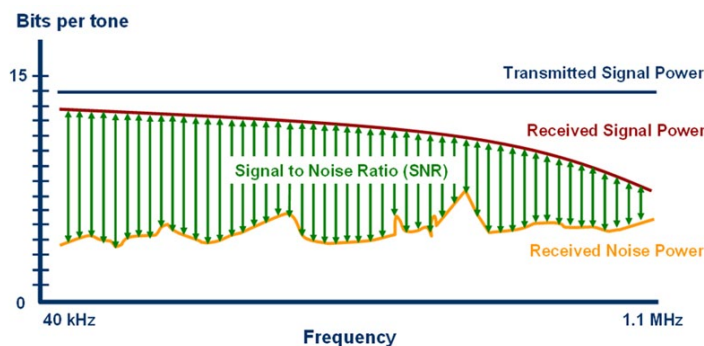
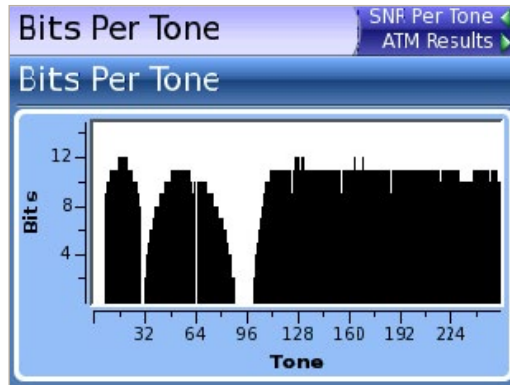


Figure 1. SNR across DSL frequency spectrum.  
 Note: the green area (SNR) can be used for the bit load and the higher the SNR value is per tone, the more bits that can be carried on that tone. 1.1 MHz is the ADSL frequency, ADSL2+ goes up to 2.2 MHz.



SmartClass TPS Bits-Per-Tone screen with an obvious disturbance around tone 96 (DSL pilot tone at 64)

The SmartClass Triple-Play Services (TPS) shows attenuation and margin value. The margin value is the SNR margin (SNRM), representing the tolerable increase in noise level or decrease in signal level while still guaranteeing a  $10^{-7}$  bit error rate (BER) at a connected rate. A typical margin value is 6 dB or greater. As ADSL2+ provides dynamic features, such as power-cutback and seamless rate adaptation (SRA), it is highly recommended not to solely rely on the relation of connect rate vs. max rate, but also factor in the underlying attenuation and margin values.

The figure is a screenshot of the 'DSL Summary' screen in the SmartClass TPS. It displays various connection statistics in a table format. The interface includes a title bar with 'DSL Summary' and a 'DSL Statistics' menu option. Below the title, it shows 'Training State' as 'SHOW TIME' and 'Trained Mode' as 'G.DMT'. The main data is presented in a table with columns for 'Up' and 'Down' directions.

	Up	Down
<b>Conn. Rate</b>	960 kbps	8.06 Mbps
<b>Max. Rate</b>	960 kbps	8.13 Mbps
<b>Capacity</b>	100 %	99 %
<b>Margin</b>	5 dB	20 dB
<b>Atten.</b>	2 dB	2 dB

SmartClass TPS DSL Summary screen

Displaying attenuation and margin values enables the SmartClass TPS to help technicians quickly test and analyze DSL lines and identify line disturbers and interferers impacting DSL rate.

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