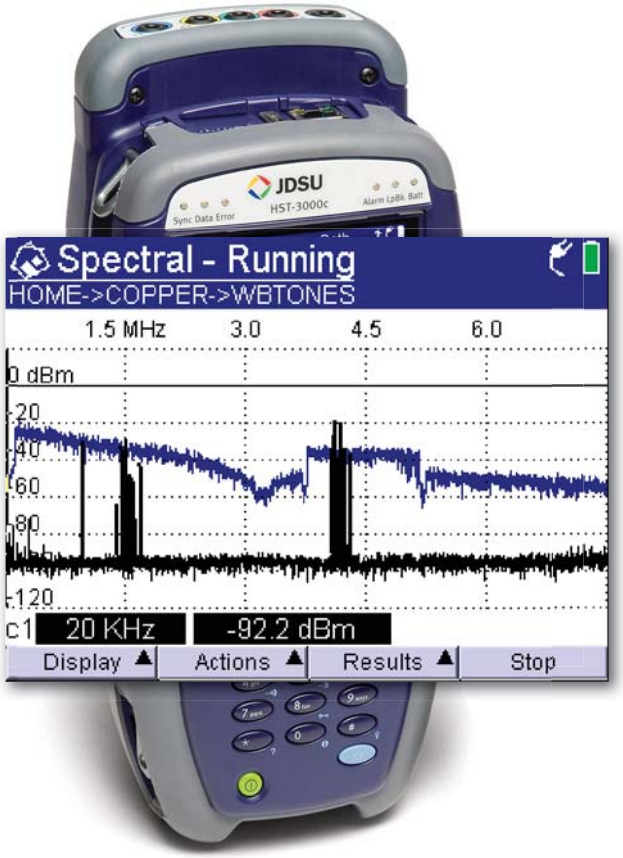
HST-3000 VDSL QUICK CARD

WIDEBAND NOISE



Revision 9.0
March 2012

Technical Assistance: 1-866-228-3762 TAC@jdsu.com

Wideband Testing - Wideband Noise

Wideband Testing Definitions

Before beginning description of the Wideband test feature found on the HST-3000 it is important the technician has a basic understanding of two main principles.

- Frequency
- Noise

Frequency: Many technicians are surprised to learn the XDSL signals while on the cable are a series of analog tones. This is an oversimplification of the technology but a very good explanation from a repair standpoint. XDSL technologies occupy groups or "spectrums" of frequency according to the technology.

For example, ADSL1 utilizes frequencies between roughly 20 kHz (20000 Hz) to 1.1 MHz (1.1000000 Hz). ADSL2+ doubles the frequency range to 2.2 MHz and VDSL2 is capable, depending on profile, of going to 30 MHz

Ideally, these spectrums of frequencies would travel from end to end on the circuit all at the same "loudness" or amplitude. However, in reality, frequency loses amplitude at a linear rate. **This means that as frequencies increase, they lose signal strength faster over the same distance.**

Consider the following table, which shows loss per kilometer for three frequencies, 1000 Hz, 300kHz, and 772kHz -- as the frequencies increased their corresponding amplitude decreases.

Table: 1 - Frequency vs Loss per Kilometer

Frequency	Loss per Kilometer
1000 Hz	1.27 dB
300,000 Hz	17.87 dB
772,000 Hz	22.56 dB

HST-3000 Test Interface

Connect dual tip & ring + ground leads to the mini-banana connectors on the top of the HST as shown below.

Plug in mini-banana connectors as shown

Technical Assistance: 1-866-228-3762 TAC@jdsu.com

Wideband Testing

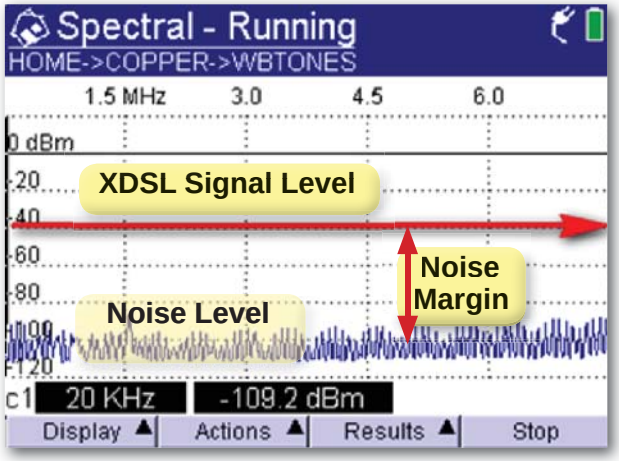
Wideband Testing Definitions

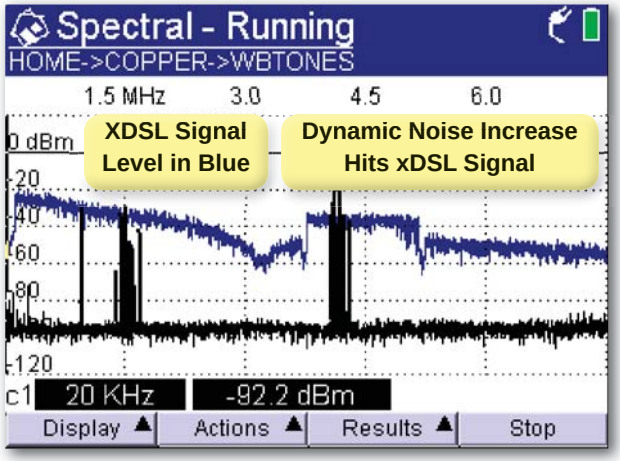
Noise: Noise can be considered any unwanted signal in the same spectrum of frequencies used by the XDSL technology. It is important for the technician to understand every cable pair has some measureable level of noise. To determine the impact of this noise it must be compared to the level of the XDSL signal.

Noise Margin: Noise margin, simply stated, is the distance or room between the XDSL signal level and the noise on the cable pair. This distance is expressed in dB rather than inches or feet. Just as it would be better to have more distance between the noise and signal it is better to have more dB(fig 1)

Noise margin is important for two main reasons. 1.) As discussed above, XDSL signals lose strength quickly. 2.) Noise is dynamic, meaning it is fluctuating up and down in signal strength. If a proper buffer or margin is not maintained noise could reach a strong enough level to mix into the XDSL signal (fig 2).

This problem increases with longer Uverse loops. Their signal strength is rapidly declining and noise accumulates as loop length increases.





Technical Assistance: 1-866-228-3762 TAC@jdsu.com

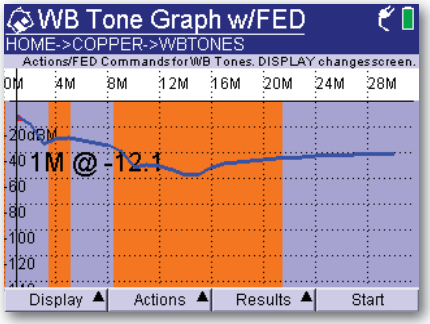
Wideband Testing

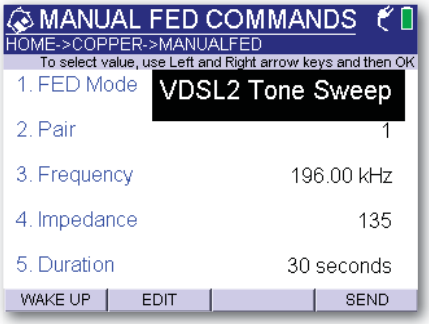
Wideband Testing Definitions

Insertion Loss:

The Insertion Loss test screen that aides in the identification of Bridge-Tap. The technician views the insertion loss screen looking for non-linear loss characteristic across the range of VDSL frequencies. The result indicates the presence of bridge-tap by the “dips” in the frequency response curve. The fact that a lower frequency has lower amplitude then a higher frequency

The **Insertion Loss** test can be performed using the HST-3000 in-conjunction with the UFED to send and receive a **VDSL2 tone sweep**. Because this is a standalone measurement it can be used on the whole circuit or across portions of the circuit during trouble shooting. Non-linear frequency response is an indication of bridge-tap or a “wet” section of cable.





Technical Assistance: 1-866-228-3762 TAC@jdsu.com

Wideband Testing - Wideband Noise

Purpose

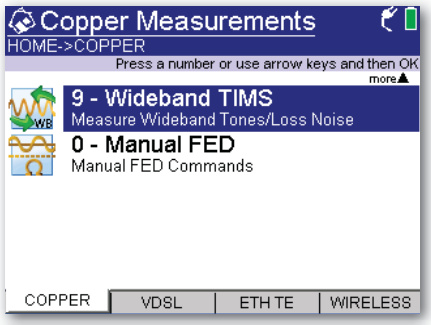
The purpose of this test is to identify the presence of wideband noise that could interfere or degrade VDSL2 performance. Unacceptable levels of noise could be due to a number of factors including bonding & grounding problems, pair imbalance, interferers within the binder group and other fault conditions.

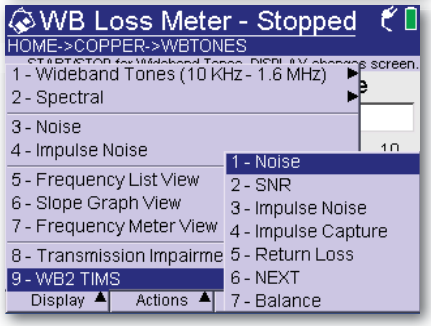
Excessive levels of wideband noise will interfere with the VDSL signal and can cause degraded performance, errors and loss of sync. This in turn, can lead to lost IP Video packets and degradation of video performance. The root cause of excessive levels of noise is typically either pair imbalance or bonding and grounding issues. It is also important to understand the characteristics of the noise source itself. Therefore, if unacceptably high levels of wideband noise are present, the Spectral Analysis function should be used to isolate the problem.

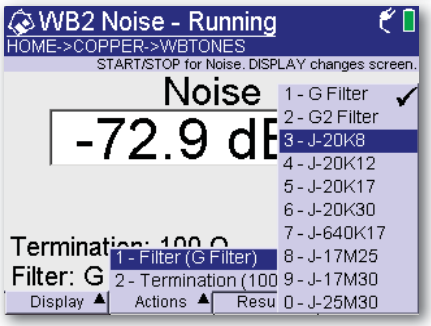
This test is typically run from the customer premises to cross box.

Procedure

1. Connect the Tip and Ring test leads from the HST-3000 to the desired pair. Connect the ground lead to a valid earth ground reference (connected to HST-3000 as shown in the figure on Page 4*)*.
2. Press the **Home** navigation key, press the **Copper** soft key and then selected **Wideband TIMS** from the menu and press **OK.**
3. Press the **Display** soft key on the lower left of the display, select **WB2 TIMS** from the pop-up menu and select **Noise** from the sub menu.
4. The Wideband Noise measurement starts automatically (**Running** indication shown at the top of the screen). To start or stop the measurement, press the **Stop / Start** soft key at the lower right of the display.
5. For VDSL loops, the Filter should be **J-20K8**. To change the filter selection, press the **Actions** soft key, select **Filter** from the pop-up menu and choose **J-20K8** from the cascaded (right) menu.
6. For VDSL loops, the Termination should be 100 Ohms. To change the termination, press the **Actions** soft key, select **Termination** from the pop-up menu and choose **100 Ohms** from the cascaded (right) menu.
7. To save results, press the **Results** soft key and select **Save Results** from the pop-up menu.
8. To change the display of the measured noise from reading in dBm to dBrn, press the **Results** soft key and select **Display Results in** dBrn. Follow the same steps to change back to displaying results in dBm.





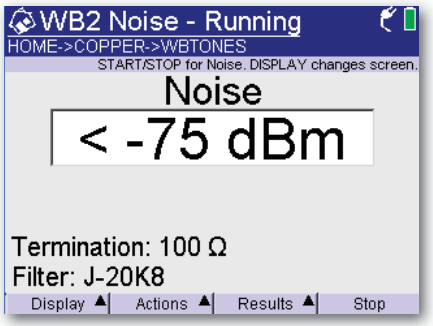


Technical Assistance: 1-866-228-3762 TAC@jdsu.com

Wideband Testing - Wideband Noise

Purpose

Wideband noise should be < -50dBm on VDSL loops. That means -90 to -50 dBm.



NOTE[1]: The YELLOW bridge cable allows for spectral reading across a working VDSL loop and is an optional high impedance cable.

NOTES:

Technical Assistance: 1-866-228-3762 TAC@jdsu.com