

# Sound Lab

## PPS, TDS and MLS comparison

### When to use MLS:

You want to measure the system accurately in the shortest time

You want to simplify or shorten your field tests

You prefer not to decide on-site which measurements to make

You want to include the environmental noise in the measurement

You consider the environmental noise low enough so that it doesn't degrade the measurement

### When to use TDS

You want to display the results quickly without post processing the MLS data

You want the best signal to noise ratio

The background noise during the measurement is different from the background noise under actual use.

You want to eliminate distortion effects from the measurement.

### When to use PPS

Any time when you would use TDS, but you need more information than what is returned in a single sweep

You want information on direct sound and reflections, but you don't want to make a large number of tests. .

Any time that you are unsure of the arrival times of the direct and reflected signals.

When you would have used MLS but you can't because the background noise is high or is greatly different than the noise during actual use.

### How are TDS and MLS the same?

MLS and TDS can both display the following types of information:

ETC - Energy Time Curves

RASTI and STI - the basis of speech intelligibility measurements

Anechoic frequency response

Frequency response at any time during the system's decay period (such as the response of an individual reflection)

## **How are TDS and MLS different?**

A MLS measurement contains information about all the environmental sounds, including direct sound, reflections and background noise.

A TDS measurement only contains information about the signal that is arriving within a desired time window. The time window is usually selected by examining ETC data. However, the measurement can be re-run with a different time window selected.

MLS can select a time window to filter with, yielding a response similar to TDS. In MLS, you can vary the width of the time window, which allows you to reject signals that are nearby in time. TDS has a fixed time window width, which makes it less capable of rejecting a second signal that arrives at nearly the same time.

## **How does PPS compare against MLS?**

PPS and MLS both save the results in a WAV file and allow the data to be post processed.

PPS uses a swept tone to make its measurement.

MLS uses a Pink Noise signal to make its measurement. However, MLS can measure without generating a sound, permitting you to analyze the environmental noise. PPS can't do this.

Both PPS and MLS allow you to filter the results for a specific time. However, PPS has a fixed time filter width, based on the original sweep. MLS has a variable time filter width, allowing more or less data to be included in the analysis.

An MLS measurement can contain 524827 samples at a 48 kHz sample rate, which permits you to do measurements with no time aliasing with a 60 dB dynamic range. RT60 times of up to 10.9 second can be determined. The bandwidth of the measurement is 20 kHz. This can't be accomplished with TDS or PPS.

The PPS measurement module can use the TDS module to do RASTI and STI evaluations of the existing measurement. It can also use the SLX module to do harmonic distortion evaluations of the existing measurement.

An MLS measurement completely describes a two-port linear system.

MLS has better frequency resolution than TDS or PPS, given the same total measurement time.

MLS can do multiple averages of the data to eliminate random noise events. TDS and PPS accomplish this by time filtering in time.

TDS and PPS have an 8 dB better signal to noise than MLS. However, MLS can achieve a better S/N ratio than TDS or PPS in cases when there are large peaks in the sound compared to the RMS average.