

## Variability of Sounder Measurements in Manufacturing Facilities

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Manufacturers are increasingly choosing wireless platforms to replace wired infrastructure in production facilities due to their ease of installation, upgradability, and reconfigurability. Reliable and secure real-time performance of wireless platforms is technically challenging because wireless data communication, reliability, and throughput can be easily effected by the electromagnetic environment in which the platforms operate. These effects need to be better understood through physics-based modeling and real-world measurements.



NIST is characterizing the wireless environment in representative production facilities through measurements of the channel impulse response. In principle, the simplest way to measure the impulse response of the channel would be to transmit a signal impulse over the channel and measure it at the receiver. This approach requires large peak powers and radar-like equipment. An alternative approach is to use a pseudo-noise channel probe signal, whereby a band-limited pseudo-noise signal is transmitted over the channel. Although the signal is not an impulse, its autocorrelation function is, so that the impulse response can be measured by correlating the received signal with a reference such as the transmitted signal.

An analysis using standard deviation against burst points or linear regression fits for fixed antenna positions of the facility measurements provides a variability of the power-delay profile. This variability provides insight into fast or slow fading profile of the production environments.