

Characterization of Ultrawideband Emissions using a Time-Domain Measurement System

Robert T. Johnk and David R. Novotny
RF Technology Division
NIST
325 Broadway
Boulder, Colorado 80305

Ultrawideband (UWB) systems that employ sub nanosecond baseband pulses have been in use since the 1970's. Early systems were used primarily for metrology-grade time-domain network analysis, sensor and antenna calibrations, precision scattering measurements, and EMP field generation. During the past decade, UWB technology has been adopted by the private sector for a wide range of innovative applications such as digital radio, local area networks, ground-penetrating radar systems, and intrusion detection. There is currently much concern on the part of civilian and military regulatory agencies such as NTIA, OSM, and the FCC about the interference potential that UWB systems will have on conventional communications, safety, and navigation systems.

Recently, a time-domain measurement system was developed at NIST to provide reference-grade measurements in support of a landmark study conducted by NTIA and ITS. The NIST system is based on a combination of a single-event waveform measurement system and ultra wide bandwidth horn antennas. This system provides a unique, full-bandwidth measurement capability that is simply unmatched by conventional CW scalar spectrum analysis systems. It was used to characterize the time and frequency-domain characteristics of a number of selected commercial UWB devices, with excellent measurement fidelity obtained. The measurements obtained were key to this landmark study, and demonstrate the power and flexibility of this precision time-domain system.