

Impact of Radio Frequency Interference on Radar Systems

Kyle A. Gallagher, Anthony F. Martone, Kelly D. Sherbondy
U.S. Army Research Laboratory
Adelphi, MD 20783, USA

Abstract

The electromagnetic (EM) spectrum is becoming more crowded each year. Take, for example, how just about every household has a functioning Wi-Fi system, and within the household may people operate a cell phone, a laptop, tablet, or other Bluetooth device. Due to the ever-growing demand for wireless devices, the Federal Communications Commission (FCC) has been auctioning off the EM spectrum since the mid 1990's and plans to auction off 500 MHz of federal and nonfederal spectrum for mobile and fixed wireless broadband. For this reason radar systems will be required to accept increased levels of radio frequency interference (RFI). As the RFI in the environment increases, radar systems will experience a decrease in radar performance. The decrease in radar performance depends on: (1) the RFI characteristics, (2) the received power level of the RFI, (3) the radar system parameters, and (4) the resilience the radar system has to RFI. Examples of current types of RFI are, Wi-Fi, Bluetooth, various cellular signals, TV stations, radio stations and more. Each of these sources of RFI have their own waveforms, power levels and other parameters that will affect radar performance. Different radar systems will have different parameters as well. These parameters will be affected by the different RFI sources in their own way. Examples of varying parameters include waveform type, pulse repetition interval, coherent processing interval, bandwidth and more. Narrowband interference can greatly interfere with a narrowband radar system if in the same frequency band, but the same narrowband interference could have less of an impact on a wideband system. Radar systems can also have the ability to adapt to different RFI scenarios, therefore the impact on these systems will be different from the impact on non-adaptive radar systems. As part of the current work, various radar systems have been simulated and RFI data has been collected. The simulated and measured data have been combined to simulate different RFI scenarios, and the impact of these RFI scenarios on different radar systems will be analyzed.