

Preface

Recent years have seen tremendous growth in use of radio frequency spectrum especially by commercial cellular operators. Ubiquitous use of smartphones and tablets is one of the reasons behind an all-time high utilization of spectrum. As a result, cellular operators are experiencing a shortage of radio spectrum to meet bandwidth demands of users. On the other hand, spectrum measurements have shown that much spectrum not held by cellular operators is underutilized even in dense urban areas. This has motivated shared access to spectrum by secondary systems with no or minimal impact to incumbent systems. Spectrum sharing is a promising approach to solve the problem of spectrum congestion as it allows cellular operators access to more spectrum in order to satisfy the ever-growing bandwidth demands of commercial users. The US spectrum regulatory bodies, the Federal Communications Commission (FCC) and the National Telecommunications and Information Administration (NTIA), are working on an initiative to share 150 MHz of spectrum, held by federal agencies, in the band 3550–3700 MHz with commercial wireless operators. This band is primarily used by the Department of Defense for air, ground, and shipborne radar systems that are critical to national defense.

Radars operating in this band are a major source of interference to communication systems. However, radar waveform can be transformed in such a way that it does not interfere with communication systems. This is accomplished by projecting the radar signal onto the null space of the wireless channel between radar and communication system. This book discusses two different types of radar waveforms that are designed specifically for congested RF spectrum environments, thus, enabling simultaneous operation of radar and communication systems.

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with Cellular Systems

A MATLAB Based Approach

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