

Signal and Power Integrity Co-Design and Antenna Integration for Silicon-Based Millimeter-Wave Front-End Modules

Signal and Power integrity is becoming very critical in modern designs involving integration of diverse design modules and domains. MmWave technology is rising as a crucial component for 5G radio access and other emerging ancillary wireless networks including Gb/s device-to-device communication and mobile backhaul. This talk covers recent advances in state-of-the-art mmWave silicon technology with an emphasis on packaging and integrated antenna design in the context of 5G communications. The main challenges in 5G hardware development and the corresponding mitigation strategies are discussed with a focus on signal and power integrity co-design of the front-end module, electromagnetic radiations, as well as RFIC, antenna and packaging integration technologies. The talk emphasizes the following key enablers for the commercial scale deployment of mm-wave technology in the 5G era: 1) highly integrated and complex circuits in silicon technologies, and 2) strategies for IC, package, antenna and board co-design and integration. Through various examples of mmWave transceivers with antennas-in-package demonstrated in hardware, this talk illustrates how these challenges can be addressed for a variety of potential 5G usage scenarios, from PAN to backhaul.