Terahertz Communications for 5G and Beyond

ABSTARCT

A brief discussion about the exclusive properties and applications of terahertz technology is provided in this chapter. The frequency spectrum terahertz (THz) is also discussed. The applications of terahertz in the field of sensors and terahertz for communications are covered. State-of-the-art literature starting from the early to the latest research conducted is provided and analyzed in terms of the performance of terahertz systems. Terahertz, known as Tera waves or T-waves rather than submillimeter wave, has approximately a fraction of a wavelength less than 30 µm. T-wave is heavily used in sensing and imaging applications, and has no ionization hazards and is an excellent candidate frequency band to defeat the multipaths interference problems for pulse communications. The lower quantum energy of T-waves identifies its potential applications toward near-field imaging, telecommunications, spectroscopy, and sensing, including medical diagnoses and security screening. Identification of DNA signatures including complex real-time molecular dynamics through dielectric resonance is a good example of terahertz spectroscopy instruments nowadays. This concluding chapter will not only address the practical applications of terahertz communications, but also identify the research challenges that lie ahead in terms of terahertz antenna design.