

Millimeter-wave Technology for the next generation of wireless systems (5G)

It is universally agreed that mm-wave (30-300 GHz) is a key enabling technology for the next generation of mobile communication, known as 5G. Use of mm-wave technology has significant advantages, such as obtaining very high throughput with low power modulation schemes, small antenna form factor, and less interference. For example, the mm-wave bands provide 10 times more bandwidth than the 4G cellular-bands. Nevertheless, some of the disadvantages compared to microwave systems are: higher propagation loss, lower generated power and blockage by buildings and most of the objects. European Union (EU) has defined several projects in horizon 2020 to develop and design new concepts for mobile radio access technology (RAT) for deployment in the 6 to 100 GHz range. These activities are led and coordinated by Samsung. Ericsson acts as technical manager, while Intel, Fraunhofer HHI, Nokia, Huawei and Samsung will each lead one of the five technical work packages of the project. In the meanwhile, in the US and Korea experiments are carried to study wave propagation and radio performance at mm-wave bands.

In this workshop, first we study the use-cases of mm-wave for 5G, and potential frequency bands at mm-wave that can be used for 5G. Then we investigate wave propagation at these bands, and discuss important channel parameters. Next, we discuss how mm-wave technology can be used in 5G radio access technology (RAT), particularly in multi-beam base station, user-end devices, smart antennas and as an enabler for advanced beamforming solutions. Besides, some of our research activities at Sharif University of Technology in mm-wave area will be presented.