

Next Generation Multi Gbps Wireless LANs and PANs

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Tutorial

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Abstract

Millimeter-wave (mmWave) technologies in the 60 GHz frequency band have been receiving a lot of attention in the recent days and are seen as a solution to meet the multi-Gbps needs of numerous applications including high-quality video streaming, rapid synchronization, wireless USB and multi-Gbps wireless LANs. The unlicensed spectrum available in the 57-64 GHz band in the USA (and 3.5GHz of common spectrum available worldwide) promises sufficient capacity to handle data rates in the order of 7 Gbps in the first generation of products. Already, the IEEE 802.11, IEEE 802.15, ECMA, Wireless Gigabit Alliance (WiGig), and WirelessHD specification bodies have formed groups to promote 60 GHz products and interoperability. These advances prove the viability of the technology for mmWave wireless PAN (WPAN) and wireless LAN (WLAN) applications, but significant challenges still remain including operation in LOS and NLOS environments, antennas, beamforming, protocols and algorithms. The mmWave regime offers unprecedented bandwidths that are sure to be exploited in novel ways.

Therefore, this tutorial focuses on how to realize next generation multi-Gbps WLANs and WPANs over mmWave frequencies. The tutorial will discuss the potential and challenges associated with deploying 60 GHz radios, and will provide timely insight to the communications and networking

communities of the challenges, research opportunities as well as the principles and designs that will drive multi-Gbps networks. The tutorial will cover physical, MAC and networking issues, as well as the standardization activities in this area and the applications of multi-Gbps WLANs and WPANs. Special emphasis will also be given to the open challenges in achieving multi-Gbps in mmWave frequencies. We hope this tutorial will act as a catalyst and resource for continued advancement of this area.

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