



Wireless Telecommunication Networks

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Course Description

This course provides a tutorial introduction of digital mobile wireless networks, illustrating theoretical underpinnings with a wide range of real-world examples. This course begins with a review of propagation phenomena, and goes on to examine channel allocation, modulation techniques, multiple access schemes, and coding techniques. GSM as the 2G system is reviewed and 2.5G and 3G packet-switched systems are discussed in detail. Performance analysis, accessing, and scheduling techniques are covered. Then, WiFi and Bluetooth, which are respectively the well-known wireless local and personal area networks, will be reviewed. At the end, the architecture and technologies in the 4G and 5G cellular networks will be introduced, and finally, the direction of future cellular networks, i.e., beyond 5G, will be discussed.

Required Texts and Useful References

- Mischa Schwartz, "Mobile Wireless Communications", 2005
- Theodore S. Rappaport. "Wireless Communications: Principles and Practice". *Prentice-Hall*, 2002

Course Content

- Historical introduction
- Characteristics of the mobile radio environment–propagation phenomena
- Cellular concept and channel allocation
- Dynamic channel allocation and power control
- Modulation techniques
- Multiple access techniques: FDMA, TDMA, CDMA; system capacity comparisons
- Second-generation, digital, wireless systems
- Performance analysis: admission control and handoffs
- 2.5G/3G Mobile wireless systems: packet-switched data
- Wireless LANs and personal-area networks
- Reviewing of 4G cellular network architecture and technologies
- An introduction to 5G cellular network technology and architecture

Grading Policy

- Assignments 25%
- Class Project 10%
- Midterm Exam 15%
- Final Exam 50%