



The
University
Of
Sheffield.

Electronic &
Electrical
Engineering.

EEE6224 MOBILE NETWORKS AND PHYSICAL LAYER PROTOCOLS

Credits: 15

Course Description including Aims

1. To give an overview of how cellular mobile communications networks operate, with specific examples of UK systems.
2. To describe the radio technology used over the air interface.
3. To describe physical layer protocols used in GSM, 3G and 4G networks.

Outline Syllabus

Description and demonstration of current UK cellular mobile networks with historical perspective. Antenna design for the RF interface, including handset, vehicle and base station antennas. EMC / health related issues of mobile handsets. GMSK, QPSK, QAM, OFDM modulation. GSM (incl. GPRS, EDGE etc.) protocol. WCDMA 3G UMTS (incl. HSDPA etc.) protocol. 4G LTE protocol. Propagation issues, diversity gain, Rake reception. MIMO. Link budgets. Cellular design strategies (femto, pico, micro, macro, umbrella etc.). Appreciation of metrics used in handset Engineering Field Test mode.

Time Allocation

36 hours lectures plus 12 hours additional support material.

Recommended Previous Courses

Background knowledge equivalent to EEE345 "Engineering Electromagnetics", EEE317 "Principles of Communications", EEE224 "Communication electronics"

Assessment

Examination 4/6 questions

Recommended Books

Redl, Siegmund M.,	<i>An Introduction to GSM</i>	Artech House
Weber, M. K. & Oliphant M. W.		
Holma, H. & Toskala, A.	<i>WCDMA for UMTS</i>	Wiley
Stremmler, F.	<i>Introduction to Communication Systems</i>	Addison Wesley

Objectives

By the end of this module successful students will be able to

1. Understand the physical layer structure of 2G, 3G and 4G terrestrial mobile networks.
2. Understand system level components such as air interface logical payload channel and frame structures and carrier modulation techniques.
3. Contribute at a professional level to cellular planning in the enhancement and roll out of future mobile networks.
4. Show awareness of the contextual significance and constant evolution of mobile technology in society.