



The
University
Of
Sheffield.

Electronic &
Electrical
Engineering.

EEE6432 WIRELESS PACKET DATA NETWORKS AND PROTOCOLS

Credits: 15

Course Description including Aims

The aim of this module is to give an understanding of the functionality of packet switching protocols at different layers of a wireless system and to appreciate how these protocols achieve reliable data delivery in wireless communication systems. An outline of the syllabus includes an introduction to packet switching in wireless networks; radio link protocols, CRC, ARQ and hybrid-ARQ; MAC protocols; packet scheduling and differentiated quality of service; routing, IP protocol, mobile IP, wireless TCP and end-to-end quality of service; radio resource management, network planning and optimisation; network examples – WiFi, HSPA or LTE.

This unit aims to introduce and provide an understanding of:

1. Packet switching in wireless networks;
2. Radio link protocols, CRC, ARQ and hybrid-ARQ;
3. MAC protocols, packet scheduling and differentiated quality of service (QoS);
4. Routing and end-to-end quality of service;
5. Radio resource management (RRM),
6. Network planning and optimisation;
7. Network examples – WiFi, HSPA or LTE

Outline Syllabus

- Lectures 1-3: Packet switching principles in wireless networks and OSI model;
- Lectures 4-9: Radio link protocols, CRC, ARQ and hybrid-ARQ;
- Lectures 10-12: MAC protocols, packet scheduling and differentiated quality of service (QoS);
- Lectures 13-15: Routing and end-to-end quality of service;
- Lectures 16-18: Radio resource management (RRM),
- Lectures 19-21: Network planning and optimisation;
- Lectures 22-24: Network examples – WiFi, HSPA or LTE.

Time Allocation

24 lectures, 6 problem solving classes and 38 hours of coursework exercises.

Recommended Previous Knowledge

UG level 3 (or equivalent) understanding of basic electronic and electrical engineering, digital communications theory and communications networks.

Assessment

Two hour examination.
Essay/Coursework.

Recommended Books

Computer Networks: A Systems Approach, Larry L. Peterson, Bruce S. Davie, Morgan Kaufmann

Wireless Communications and Networks, William Stallings, Prentice Hall

Computer Networks: International Version, Andrew S. Tanenbaum, David J. Wetherall, Pearson

WCDMA for UMTS: HSPA Evolution and LTE, Harri Holma, Antti Toskala, John Wiley & Sons

LTE for UMTS: Evolution to LTE-Advanced: Evolution to LTE-Advanced, Harri Holma, Antti Toskala, John Wiley & Sons

WCDMA for UMTS – Radio Access for Third Generation Mobile Communications, Harri Holma, Antti Toskala, John Wiley & Sons

Objectives

By the end of the module a successful student will be able to:

1. Appreciate packet switching principles in wireless networks;
2. Understand the fundamentals of reliable packet exchange;
3. Understand and analyse prevailing channel access protocols;
4. Appreciate internet routing and end-to-end QoS procedures;
5. Analyse and design RRM policies for wireless networks;
6. Plan wireless network deployments;
7. Understand & appreciate prevailing network architectures.