

Notes for DigiComm II

CL

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0.1 Digital Communication II

Lecturer: Prof. J.A. Crowcroft and others

No. of lectures and examples classes: 20 + 4

Prerequisite course: Digital Communication I

This course is a prerequisite for Security (Part II), Advanced Systems Topics (Part II).

Aims

This course aims to provide a detailed understanding of how communications systems operate, through the examples including the Internet amongst others, and presents ways to build such systems. It also covers a selection of topics which relate to recent trends in digital communications systems.

Lectures

- **Introduction.** Course overview. Abstraction, layering. The structure of real networks. [JAC]
- **The Telephone Net.** It has been around 100 years, and there are important lessons in how it survived and evolved. [JAC]
- **The Internet.** It is about 25 years old, and looking decidedly shakey. A quick review of where it is at. [JAC]
- **Asynchronous Transfer Mode networks.** A bold attempt to mix Telephone and Internet. [JAC]
- **Modular Functionality for Communications.** Some Systems Design Paradigms, often orthogonal to Layers [JAC]
- **Naming and Addressing.** Reviewing Who is where? [JAC]
- **A List of common protocols in use today.** To see if we can spot design patterns? and Mapping onto common implementation approaches. [JAC]
- **Routing.** How many ways can we work out how to get from A to B? [JAC, 2 lectures]

- **Error Control.** what do we do when things go wrong? retransmit, or pre-transmit? [JAC]
- **Flow Control.** Stemming the flood, at source, sink, or in between? [JAC]
- **Shared Media Networks** Ethernet and Radio networks - some special problems for Media Access and so forth. [JAC, 2 lectures]
- **Switched Networks.** What does a switch do and how? [JAC, 2 lectures]
- **Integrated Service Packet Networks for IP** APIs to Quality of Service Scheduling and Queue Management Algorithms for packet forwarding What about routing with QoS [JAC, 2 lectures]
- **The Big Picture for managing traffic** Economics, Policy and a little MPLS [JAC, 2 lectures]

Objectives

At the end of the course students should be able to explain the concepts such as Addressing, Buffer Management, Congestion Control, Differential Services, Estimation, Feedback, Gateways, Hierarchy, IP, Jitter, k-ary resilience, Layering, Multiplexing, Networking, OSI, Priority, Queuing, Routing, Switching, Transmission Control, User Plane, Virtualisation, Wireless, eXtensibility, or, ok, Xen:), Yield management, and Zeroconf.

Recommended reading

* Keshav, S. (1997). *An engineering approach to computer networking*. Addison-Wesley (1st ed.). ISBN 0201634422

Alternatives to Keshav:

Davie, B.S., Peterson, L.L. & Clark, D. (1999). *Computer networks: a systems approach*. Morgan Kaufmann (2nd ed.). ISBN 1558605142

Stevens, W.R. (1994). *TCP/IP illustrated, volume 1: the protocols*. Addison-Wesley (1st ed.). ISBN 0201633469