Notes for DigiComm II

CL

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0.1 Digital Communication II

Lecturers: Jon Crowcroft, plus guests (jon.crowcroft@cl.cam.ac.uk)
No. of lectures: 20, or so
Prerequisite course: Digital Communication I
This course is a prerequisite for Security (Part II).

Aims

This course aims to provide a detailed understanding of how computer net-
works operate, through the examples of the Internet, and presents ways to build
such systems. It also covers a selection of topics which relate to recent trends
in digital communications systems. The material falls roughly into two halves:
Protocols, and Technologies/Performance.

Lectures

• Introduction. Course overview. Some example networks. Abstraction,
layering. The OSI reference model.

• The Internet: IP. IP overview/review. Networking in Unix: structures,
buffering, sockets, network interfaces. IP addresses and (simple) routing.
Subnetting. IP checksum. Fragmentation.

• The Internet: routing. Terminology: AS, IGP, EGP. Routing protocols: distance vector versus link state. Examples: RIP, OSPF. AS routing:
I-BGP/E-BGP, metrics.

• The Internet: UDP, TCP TCP operation, state transitions. Handling
Improving things: TCP Vegas, SACKs, ECN.

• The Internet: network resource management. Differentiated and
Integrated Services. Signaling (RSVP) and Admission Control, Forward-
ing and Scheduling, Policing and Shaping. The future.

• The Internet: Applications, Multimedia, NFS & HTTP RTP
operation, Playout adaption;

- **Pricing and other Miscellany.** Model and motivation. Practical considerations. The future.

**Objectives**

At the end of the course students should be able to

- enumerate and explain the layers of the OSI reference model
- compare and contrast connectionless and connection-oriented networks
- explain how IP routing works
- describe the components of the Internet resource management system
- describe how and why TCP attempts to handle congestion in the network

**Recommended books**

Quite a lot of reference is made to this first book.


This is a really good practical reference:


This last one is great if you are doing higher level work.