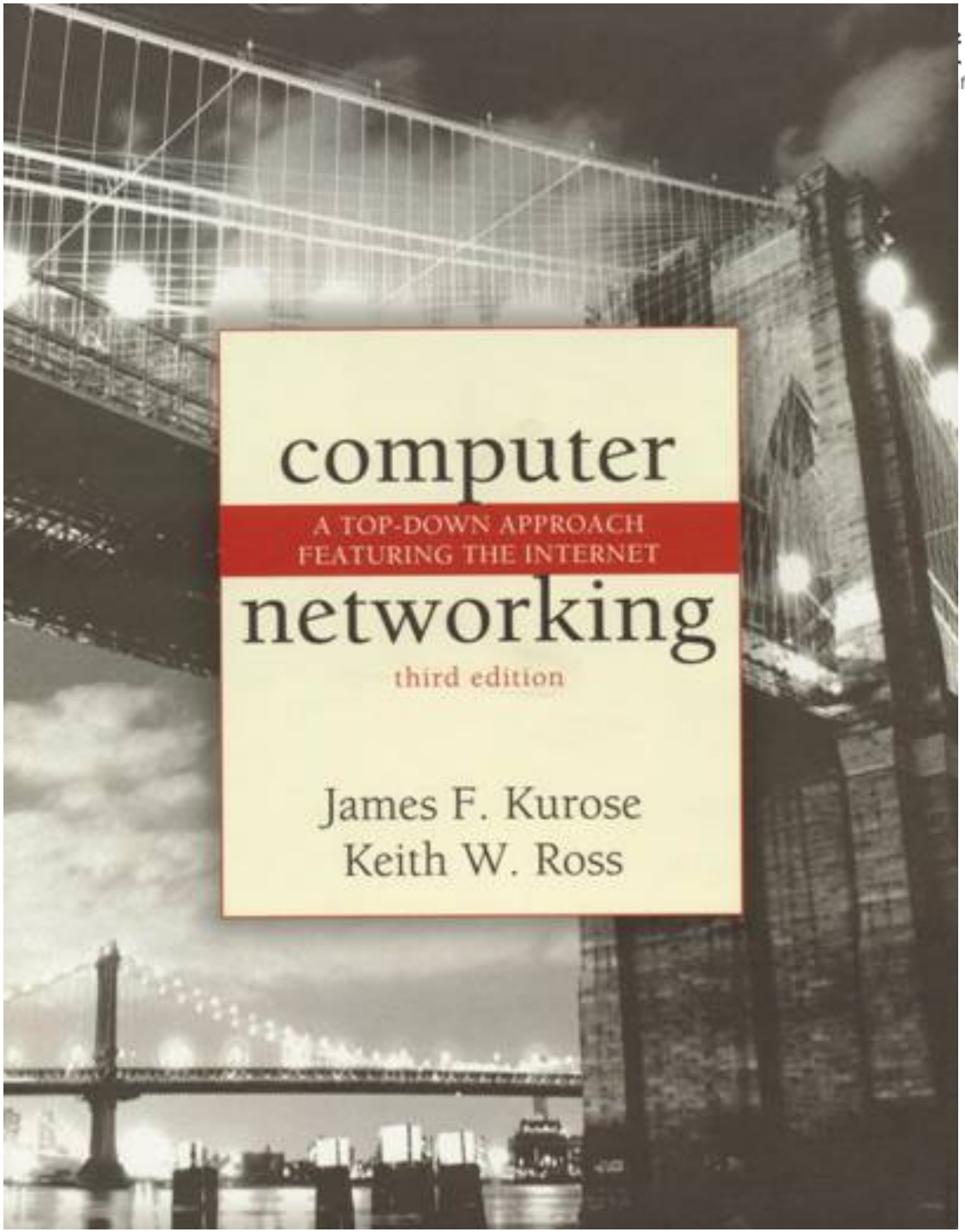
Chapter 0

Computer Networking:
A Top Down Approach Featuring the Internet,
3rd edition.
Jim Kurose, Keith Ross
Addison-Wesley,
July 2004.



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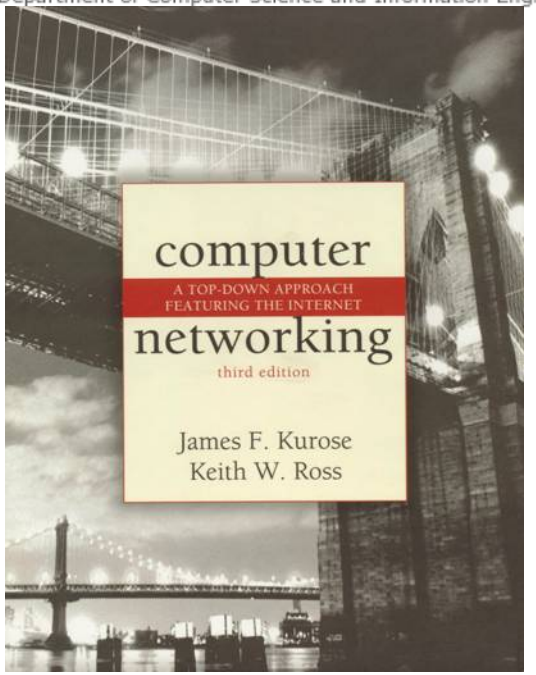
Outline

- Chapter 0: Syllabus
- Chapter 1: Introduction
- Chapter 2: Application Layer
- Chapter 3: Transport Layer
- Chapter 4: Network Layer
- Chapter 5: Link Layer and LANs
- Chapter 6: Wireless and Mobile Networks
- Chapter 7: Multimedia Networking
- Chapter 8: Network Security
- Chapter 9: Network Management

Chapter 1 Introduction



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Chapter 1: Introduction

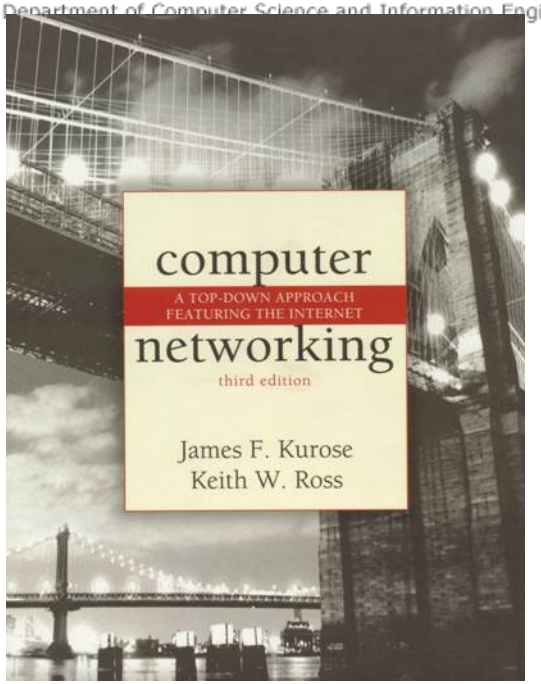
Our goal:

- get "feel" and terminology
- more depth, detail *later* in course
- approach:
  - use Internet as example

Overview:

- what's the Internet
- what's a protocol?
- network edge
- network core
- access net, physical media
- Internet/ISP structure
- performance: loss, delay
- protocol layers, service models
- network modeling

Chapter 2
Application Layer



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Chapter 2: Application layer

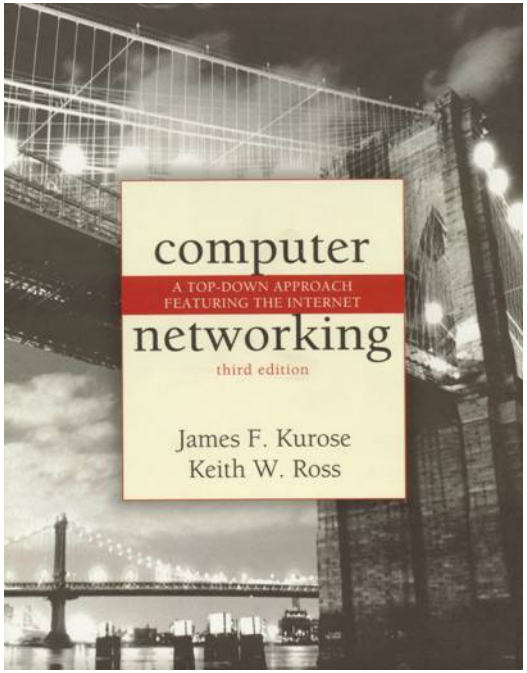
- 2.1 Principles of network applications
- 2.2 Web and HTTP
- 2.3 FTP
- 2.4 Electronic Mail
  - SMTP, POP3, IMAP
- 2.5 DNS
- 2.6 P2P file sharing
- 2.7 Socket programming with TCP
- 2.8 Socket programming with UDP
- 2.9 Building a Web server

Chapter 2: Application Layer

Our goals:

- conceptual, implementation aspects of network application protocols
  - transport-layer service models
  - client-server paradigm
  - peer-to-peer paradigm
- learn about protocols by examining popular application-level protocols
  - HTTP
  - FTP
  - SMTP / POP3 / IMAP
  - DNS
- programming network applications
  - socket API

Chapter 3
Transport Layer



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Chapter 3: Transport Layer

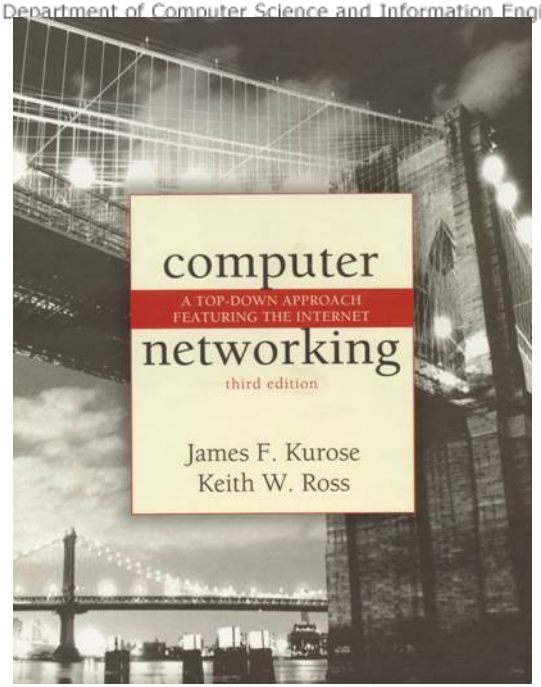
Our goals:

- understand principles behind transport layer services:
  - multiplexing/demultiplexing
  - reliable data transfer
  - flow control
  - congestion control
- learn about transport layer protocols in the Internet:
  - UDP: connectionless transport
  - TCP: connection-oriented transport
  - TCP congestion control

Chapter 3 outline

- 3.1 Transport-layer services
- 3.2 Multiplexing and demultiplexing
- 3.3 Connectionless transport: UDP
- 3.4 Principles of reliable data transfer
- 3.5 Connection-oriented transport: TCP
  - segment structure
  - reliable data transfer
  - flow control
  - connection management
- 3.6 Principles of congestion control
- 3.7 TCP congestion control

Chapter 4
Network Layer



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Chapter 4: Network Layer

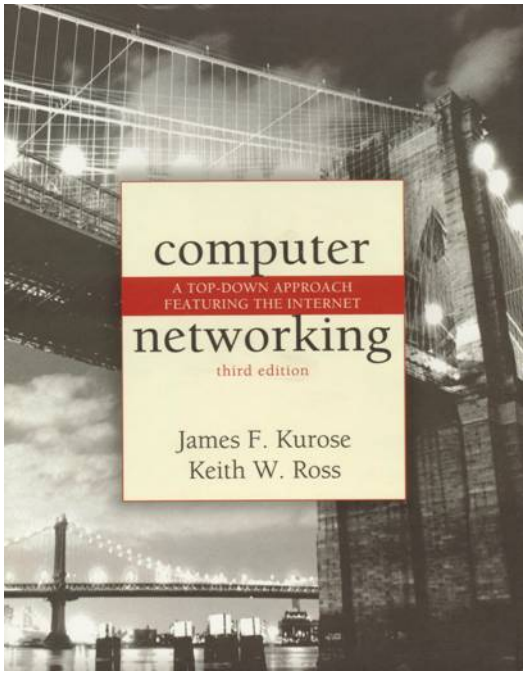
Chapter goals:

- understand principles behind network layer services:
  - routing (path selection)
  - dealing with scale
  - how a router works
  - advanced topics: IPv6, mobility
- instantiation and implementation in the Internet

Chapter 4: Network Layer

- 4. 1 Introduction
- 4.2 Virtual circuit and datagram networks
- 4.3 What's inside a router
- 4.4 IP: Internet Protocol
  - Datagram format
  - IPv4 addressing
  - ICMP
  - IPv6
- 4.5 Routing algorithms
  - Link state
  - Distance Vector
  - Hierarchical routing
- 4.6 Routing in the Internet
  - RIP
  - OSPF
  - BGP
- 4.7 Broadcast and multicast routing

Chapter 5
Link Layer and LANs



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Chapter 5: The Data Link Layer

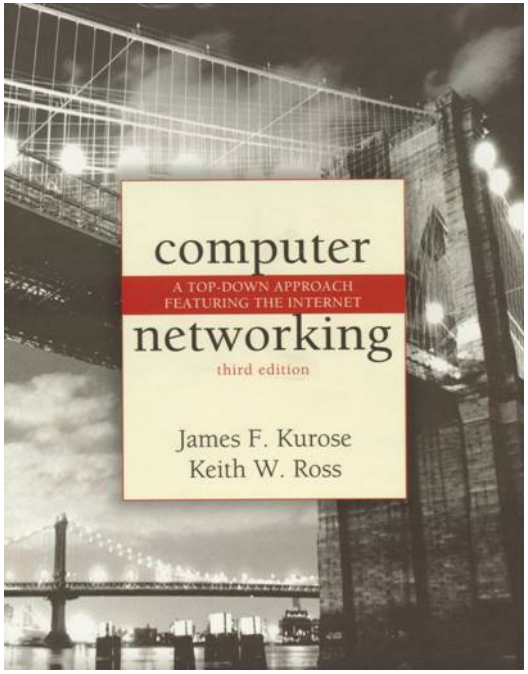
Our goals:

- understand principles behind data link layer services:
  - error detection, correction
  - sharing a broadcast channel: multiple access
  - link layer addressing
  - reliable data transfer, flow control: *done!*
- instantiation and implementation of various link layer technologies

Link Layer

- 5.1 Introduction and services
- 5.2 Error detection and correction
- 5.3Multiple access protocols
- 5.4 Link-Layer Addressing
- 5.5 Ethernet
- 5.6 Hubs and switches
- 5.7 PPP
- 5.8 Link Virtualization: ATM and MPLS

Chapter 6
Wireless and Mobile Networks



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Chapter 6: Wireless and Mobile Networks

Background:

- # wireless (mobile) phone subscribers now exceeds # wired phone subscribers!
- computer nets: laptops, palmtops, PDAs, Internet-enabled phone promise anytime untethered Internet access
- two important (but different) challenges
  - communication over wireless link
  - handling mobile user who changes point of attachment to network

Chapter 6 outline

6.1 Introduction

Wireless

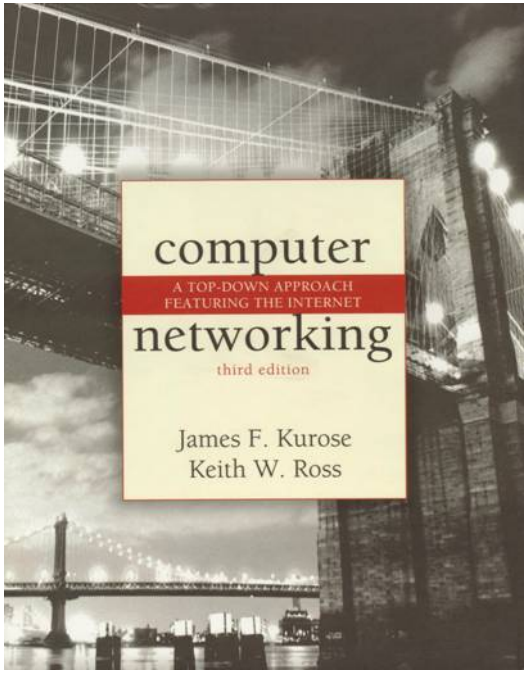
- 6.2 Wireless links, characteristics
  - CDMA
- 6.3 IEEE 802.11 wireless LANs ("wi-fi")
- 6.4 Cellular Internet Access
  - architecture
  - standards (e.g., GSM)

Mobility

- 6.5 Principles: addressing and routing to mobile users
- 6.6 Mobile IP
- 6.7 Handling mobility in cellular networks
- 6.8 Mobility and higher-layer protocols

6.9 Summary

Chapter 7
Multimedia Networking



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Chapter 7: Goals

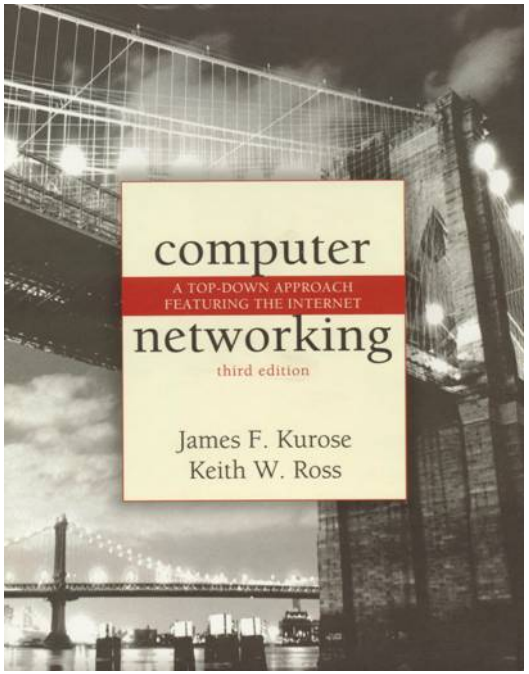
Principles

- Classify multimedia applications
- Identify the network services the apps need
- Making the best of best effort service
- Mechanisms for providing QoS

Protocols and Architectures

- Specific protocols for best-effort
- Architectures for QoS

Chapter 8
Network Security



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Chapter 8: Network Security

Chapter goals:

- understand principles of network security:
  - cryptography and its *many* uses beyond "confidentiality"
  - authentication
  - message integrity
  - key distribution
- security in practice:
  - firewalls
  - security in application, transport, network, link layers

Chapter 8 roadmap

8.1 What is network security?

8.2 Principles of cryptography

8.3 Authentication

8.4 Integrity

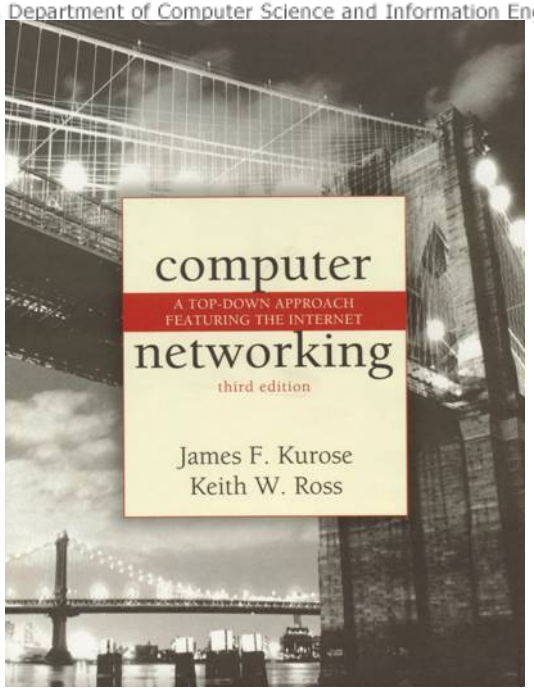
8.5 Key Distribution and certification

8.6 Access control: firewalls

8.7 Attacks and counter measures

8.8 Security in many layers

Chapter 9
Network Management



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Chapter 9: Network Management

Chapter goals:

- introduction to network management
  - motivation
  - major components
- Internet network management framework
  - MIB: management information base
  - SMI: data definition language
  - SNMP: protocol for network management
  - security and administration
- presentation services: ASN.1

Chapter 9 outline

- What is network management?
- Internet-standard management framework
  - Structure of Management Information: SMI
  - Management Information Base: MIB
  - SNMP Protocol Operations and Transport Mappings
  - Security and Administration
- ASN.1

計分方式

- Computer network (70%)
  - 期中考
  - 期末考
  - homeworks
- Computer network 實習課 (30%)
  - 期中考
  - 期末考
  - homeworks