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READING LIST AND BIBLIOGRAPHY

We have now finished our study of computer networks, but this is only the beginning. Many interesting topics have not been treated in as much detail as they deserve, and others have been omitted altogether for lack of space. In this chapter, we provide some suggestions for further reading and a bibliography, for the benefit of readers who wish to continue their study of computer networks.

9.1 SUGGESTIONS FOR FURTHER READING

There is an extensive literature on all aspects of computer networks. Two journals that publish papers in this area are *IEEE/ACM Transactions on Networking* and *IEEE Journal on Selected Areas in Communications*.

The periodicals of the ACM Special Interest Groups on Data Communications (SIGCOMM) and Mobility of Systems, Users, Data, and Computing (SIGMOBILE) publish many papers of interest, especially on emerging topics. They are *Computer Communication Review* and *Mobile Computing and Communications Review*.

IEEE also publishes three magazines—*IEEE Internet Computing*, *IEEE Network Magazine*, and *IEEE Communications Magazine*—that contain surveys, tutorials, and case studies on networking. The first two emphasize architecture, standards, and software, and the last tends toward communications technology (fiber optics, satellites, and so on).

There are a number of annual or biannual conferences that attract numerous papers on networks. In particular, look for the *SIGCOMM* conference, *NSDI* (Symposium on Networked Systems Design and Implementation), *MobiSys* (Conference on Mobile Systems, Applications, and Services), *SOSP* (Symposium on Operating Systems Principles) and *OSDI* (Symposium on Operating Systems Design and Implementation).

Below we list some suggestions for supplementary reading, keyed to the chapters of this book. Many of the suggestions are books of chapters in books, with some tutorials and surveys. Full references are in Sec. 9.2.

9.1.1 Introduction and General Works

Comer, *The Internet Book*, 4th ed.

Anyone looking for an easygoing introduction to the Internet should look here. Comer describes the history, growth, technology, protocols, and services of the Internet in terms that novices can understand, but so much material is covered that the book is also of interest to more technical readers.

Computer Communication Review, 25th Anniversary Issue, Jan. 1995

For a firsthand look at how the Internet developed, this special issue collects important papers up to 1995. Included are papers that show the development of TCP, multicast, the DNS, Ethernet, and the overall architecture.

Crovella and Krishnamurthy, *Internet Measurement*

How do we know how well the Internet works anyway? This question is not trivial to answer because no one is in charge of the Internet. This book describes the techniques that have been developed to measure the operation of the Internet, from network infrastructure to applications.

IEEE Internet Computing, Jan.–Feb. 2000

The first issue of *IEEE Internet Computing* in the new millennium did exactly what you would expect: it asked the people who helped create the Internet in the previous millennium to speculate on where it is going in the next one. The experts are Paul Baran, Lawrence Roberts, Leonard Kleinrock, Stephen Crocker, Danny Cohen, Bob Metcalfe, Bill Gates, Bill Joy, and others. See how well their predictions have fared over a decade later.

Kipnis, “Beating the System: Abuses of the Standards Adoption Process”

Standards committees try to be fair and vendor neutral in their work, but unfortunately there are companies that try to abuse the system. For example, it has happened repeatedly that a company helps develop a standard and then after it is approved, announces that the standard is based on a patent it owns and which it will license to companies that it likes and not to companies that it does not like, at

prices that it alone determines. For a look at the dark side of standardization, this article is an excellent start.

Hafner and Lyon, *Where Wizards Stay Up Late*

Naughton, *A Brief History of the Future*

Who invented the Internet, anyway? Many people have claimed credit. And rightly so, since many people had a hand in it, in different ways. There was Paul Baran, who wrote a report describing packet switching, there were the people at various universities who designed the ARPANET architecture, there were the people at BBN who programmed the first IMPs, there were Bob Kahn and Vint Cerf who invented TCP/IP, and so on. These books tell the story of the Internet, at least up to 2000, replete with many anecdotes.

9.1.2 The Physical Layer

Bellamy, *Digital Telephony*, 3rd ed.

For a look back at that other important network, the telephone network, this authoritative book contains everything you ever wanted to know and more. Particularly interesting are the chapters on transmission and multiplexing, digital switching, fiber optics, mobile telephony, and DSL.

Hu and Li, "Satellite-Based Internet: A Tutorial"

Internet access via satellite is different from using terrestrial lines. Not only is there the issue of delay, but routing and switching are also different. In this paper, the authors examine the issues related to using satellites for Internet access.

Joel, "Telecommunications and the IEEE Communications Society"

For a compact but surprisingly comprehensive history of telecommunications, starting with the telegraph and ending with 802.11, this article is the place to look. It also covers radio, telephones, analog and digital switching, submarine cables, digital transmission, television broadcasting, satellites, cable TV, optical communications, mobile phones, packet switching, the ARPANET, and the Internet.

Palais, *Fiber Optic Communication*, 5th ed.

Books on fiber optic technology tend to be aimed at the specialist, but this one is more accessible than most. It covers waveguides, light sources, light detectors, couplers, modulation, noise, and many other topics.

Su, *The UMTS Air Interface in RF Engineering*

This book provides a detailed overview of one of the main 3G cellular systems. It is focused on the air interface, or wireless protocols that are used between mobiles and the network infrastructure.

Want, *RFID Explained*

Want's book is an easy-to-read primer on how the unusual technology of the RFID physical layer works. It covers all aspects of RFID, including its potential applications. Some real-world examples of RFID deployments and the experience gained from them is also covered.

9.1.3 The Data Link Layer

Kasim, *Delivering Carrier Ethernet*

Nowadays, Ethernet is not only a local-area technology. The new fashion is to use Ethernet as a long-distance link for carrier-grade Ethernet. This book brings together essays to cover the topic in depth.

Lin and Costello, *Error Control Coding*, 2nd ed.

Codes to detect and correct errors are central to reliable computer networks. This popular textbook explains some of the most important codes, from simple linear Hamming codes to more complex low-density parity check codes. It tries to do so with the minimum algebra necessary, but that is still a lot.

Stallings, *Data and Computer Communications*, 9th ed.

Part two covers digital data transmission and a variety of links, including error detection, error control with retransmissions, and flow control.

9.1.4 The Medium Access Control Sublayer

Andrews et al., *Fundamentals of WiMAX*

This comprehensive book gives a definitive treatment of WiMAX technology, from the idea of broadband wireless, to the wireless techniques using OFDM and multiple antennas, through the multi-access system. Its tutorial style gives about the most accessible treatment you will find for this heavy material.

Gast, *802.11 Wireless Networks*, 2nd ed.

For a readable introduction to the technology and protocols of 802.11, this is a good place to start. It begins with the MAC sublayer, then introduces material on the different physical layers and also security. However, the second edition is not new enough to have much to say about 802.11n.

Perlman, *Interconnections*, 2nd ed.

For an authoritative but entertaining treatment of bridges, routers, and routing in general, Perlman's book is the place to look. The author designed the algorithms used in the IEEE 802 spanning tree bridge and she is one of the world's leading authorities on various aspects of networking.

9.1.5 The Network Layer

Comer, *Internetworking with TCP/IP*, Vol. 1, 5th ed.

Comer has written the definitive work on the TCP/IP protocol suite, now in its fifth edition. Most of the first half deals with IP and related protocols in the network layer. The other chapters deal primarily with the higher layers and are also worth reading.

Grayson et al., *IP Design for Mobile Networks*

Traditional telephone networks and the Internet are on a collision course, with mobile phone networks being implemented with IP on the inside. This book tells how to design a network using the IP protocols that supports mobile telephone service.

Huitema, *Routing in the Internet*, 2nd ed.

If you want to gain a deep understanding of routing protocols, this is a very good book. Both pronounceable algorithms (e.g., RIP, and CIDR) and unpronounceable algorithms (e.g., OSPF, IGRP, and BGP) are treated in great detail. Newer developments are not covered since this is an older book, but what is covered is explained very well.

Koodli and Perkins, *Mobile Inter-networking with IPv6*

Two important network layer developments are presented in one volume: IPv6 and Mobile IP. Both topics are covered well, and Perkins was one of the driving forces behind Mobile IP.

Nucci and Papagiannaki, *Design, Measurement and Management of Large-Scale IP Networks*

We talked a great deal about how networks work, but not how you would design, deploy and manage one if you were an ISP. This book fills that gap, looking at modern methods for traffic engineering and how ISPs provide services using networks.

Perlman, *Interconnections*, 2nd ed.

In Chaps. 12 through 15, Perlman describes many of the issues involved in unicast and multicast routing algorithm design, both for wide area networks and networks of LANs. But by far, the best part of the book is Chap. 18, in which the author distills her many years of experience with network protocols into an informative and fun chapter. It is required reading for protocol designers.

Stevens, *TCP/IP Illustrated*, Vol. 1

Chapters 3–10 provide a comprehensive treatment of IP and related protocols (ARP, RARP, and ICMP), illustrated by examples.

Varghese, *Network Algorithmics*

We have spent much time talking about how routers and other network elements interact with each other. This book is different: it is about how routers are actually designed to forward packets at prodigious speeds. For the inside scoop on that and related questions, this is the book to read. The author is an authority on clever algorithms that are used in practice to implement high-speed network elements in software and hardware.

9.1.6 The Transport Layer

Comer, *Internetworking with TCP/IP*, Vol. 1, 5th ed.

As mentioned above, Comer has written the definitive work on the TCP/IP protocol suite. The second half of the book is about UDP and TCP.

Farrell and Cahill, *Delay- and Disruption-Tolerant Networking*

This short book is the one to read for a deeper look at the architecture, protocols, and applications of “challenged networks” that must operate under harsh conditions of connectivity. The authors have participated in the development of DTNs in the IETF DTN Research Group.

Stevens, *TCP/IP Illustrated*, Vol. 1

Chapters 17–24 provide a comprehensive treatment of TCP illustrated by examples.

9.1.7 The Application Layer

Berners-Lee et al., “The World Wide Web”

Take a trip back in time for a perspective on the Web and where it is going by the person who invented it and some of his colleagues at CERN. The article focuses on the Web architecture, URLs, HTTP, and HTML, as well as future directions, and compares it to other distributed information systems.

Held, *A Practical Guide to Content Delivery Networks*, 2nd ed.

This book gives a down-to-earth exposition of how CDNs work, emphasizing the practical considerations in designing and operating a CDN that performs well.

Hunter et al., *Beginning XML*, 4th ed.

There are many, many books on HTML, XML and Web services. This 1000-page book covers most of what you are likely to want to know. It explains not only how to write XML and XHTML, but also how to develop Web services that produce and manipulate XML using Ajax, SOAP, and other techniques that are commonly used in practice.

Krishnamurthy and Rexford, *Web Protocols and Practice*

It would be hard to find a more comprehensive book about all aspects of the Web than this one. It covers clients, servers, proxies, and caching, as you might expect. But there are also chapters on Web traffic and measurements as well as chapters on current research and improving the Web.

Simpson, *Video Over IP*, 2nd ed.

The author takes a broad look at how IP technology can be used to move video across networks, both on the Internet and in private networks designed to carry video. Interestingly, this book is oriented for the video professional learning about networking, rather than the other way around.

Wittenburg, *Understanding Voice Over IP Technology*

This book covers how voice over IP works, from carrying audio data with the IP protocols and quality-of-service issues, through to the SIP and H.323 suite of protocols. It is necessarily detailed given the material, but accessible and broken up into digestible units.

9.1.8 Network Security

Anderson, *Security Engineering*, 2nd. ed.

This book presents a wonderful mix of security techniques couched in an understanding of how people use (and misuse) them. It is more technical than *Secrets and Lies*, but less technical than *Network Security* (see below). After an introduction to the basic security techniques, entire chapters are devoted to various applications, including banking, nuclear command and control, security printing, biometrics, physical security, electronic warfare, telecom security, e-commerce, and copyright protection.

Ferguson et al., *Cryptography Engineering*

Many books tell you how the popular cryptographic algorithms work. This book tells you how to use cryptography—why cryptographic protocols are designed the way they are and how to put them together into a system that will meet your security goals. It is a fairly compact book that is essential reading for anyone designing systems that depend on cryptography.

Fridrich, *Steganography in Digital Media*

Steganography goes back to ancient Greece, where the wax was melted off blank tablets so secret messages could be applied to the underlying wood before the wax was reapplied. Nowadays, videos, audio, and other content on the Internet provide different carriers for secret messages. Various modern techniques for hiding and finding information in images are discussed here.

Kaufman et al., *Network Security*, 2nd ed.

This authoritative and witty book is the first place to look for more technical information on network security algorithms and protocols. Secret and public key algorithms and protocols, message hashes, authentication, Kerberos, PKI, IPsec, SSL/TLS, and email security are all explained carefully and at considerable length, with many examples. Chapter 26, on security folklore, is a real gem. In security, the devil is in the details. Anyone planning to design a security system that will actually be used will learn a lot from the real-world advice in this chapter.

Schneier, *Secrets and Lies*

If you read *Cryptography Engineering* from cover to cover, you will know everything there is to know about cryptographic algorithms. If you then read *Secrets and Lies* cover to cover (which can be done in a lot less time), you will learn that cryptographic algorithms are not the whole story. Most security weaknesses are not due to faulty algorithms or even keys that are too short, but to flaws in the security environment. For a nontechnical and fascinating discussion of computer security in the broadest sense, this book is a very good read.

Skoudis and Liston, *Counter Hack Reloaded*, 2nd ed.

The best way to stop a hacker is to think like a hacker. This book shows how hackers see a network, and argues that security should be a function of the entire network's design, not an afterthought based on one specific technology. It covers almost all common attacks, including the "social engineering" types that take advantage of users who are not always familiar with computer security measures.

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