

TER Volume 5, Issue 9, October 15, 1998

ter

telecommunications electronic reviews

Volume 5, Issue 9, October 15, 1998

Telecommunications Electronic Reviews (TER) is a publication of the Library and Information Technology Association.

Telecommunications Electronic Reviews (ISSN: 1075-9972) is a periodical copyright © 1998 by the American Library Association. Documents in this issue, subject to copyright by the American Library Association or by the authors of the documents, may be reproduced for noncommercial, educational, or scientific purposes granted by Sections 107 and 108 of the Copyright Revision Act of 1976, provided that the copyright statement and source for that material are clearly acknowledged and that the material is reproduced without alteration. None of these documents may be reproduced or adapted for commercial distribution without the prior written permission of the designated copyright holder for the specific documents.

Contents:

- REVIEW OF: Dave Raggett, Jenny Lam, Ian Alexander, and Michael Kmiec. *Raggett on HTML 4, 2nd ed.* by Martin R. Kalfatovic
- REVIEW OF: James Carlson. *PPP Design and Debugging.* by Ray Olszewski
- REVIEW OF: Cass R. Lewart. *The Ultimate Modem Handbook: Your Guide to Selection, Installation, Troubleshooting, and Optimization.* by Glenda Slaughter
- About TER

 [ter issues \(/lita/publications/archive/ter\)](/lita/publications/archive/ter)

REVIEW OF: Dave Raggett, Jenny Lam, Ian Alexander, and Michael Kmiec. *Raggett on HTML 4, 2nd ed.* Reading, MA: Addison-Wesley, 1998.

by Martin R. Kalfatovic

With so much information on HTML (Hypertext Markup Language) available for the free Web browsing, any guidebook, manual or handbook that costs more than the paper it would take to print out its Web competitor had better be very good. Raggett on HTML 4 meets this criteria.

For the experienced HTML writer, be forewarned: HTML 4.0 is a much different creature than the previous standard version, HTML 3.2. HTML 4.0 introduces a number of new tags, features, and functionality that allow you to use HTML to create screen layouts that approach the look of desktop publishing. Unfortunately, your "old" browsers will be unable to interpret much of what's new in HTML 4.0, and page designers will have to be careful to create pages that degrade for the majority of the world who are not yet (in early 1998) using an HTML 4.0 compliant browser such as Netscape 4.0 or Internet Explorer 4.0.

Dave Raggett, a member of the World Web Consortium (W3C) for HTML, heads up a team of authors (Jenny Lam, Ian Alexander and Michael Kmiec) in this second edition of his work. Though there are occasional slips in the text that indicate that a sentence or paragraph was not updated from the first edition, in total, the book shows extensive revision and updating from the first edition. The authors also include the obligatory introduction to the WWW and a history of HTML and an introduction to Internet conventions for the newly initiated. Raggett and company keep a wry sense of humor throughout. Their various examples are both useful and display--as befitting Raggett's United Kingdom origins--a cool humor and British slant.

The authors start with a simple tutorial that will guide you through the process of creating an HTML document that incorporates elements of HTML 4.0. In logical progression, how to control various parts of the document are handled in turn. Paragraphs, character emphasis, lists, hypertext links, and graphics are each discussed in their own chapters.

About a third of the way through, the authors introduce the concept of Cascading Style Sheets (CSS). CSS are a feature of HTML 4.0 that allows the writer to globally control a number of HTML elements. This clear and well-written chapter is a good introduction to CSS. [1]

More complex elements--and their HTML 4.0 enhancements--are discussed in the remainder of the book. Tables, forms, frames, and image maps close out discussion of familiar elements. Client-side scripting in HTML 4.0 is discussed at length as is the object element which allows for the handling of multimedia within WWW documents.

A number of appendixes conclude the book. In addition to the standard appendixes to be expected in a work of this type (e.g., a list of tags, examples of the use of tags, and non-standard character codes), Raggett and company, with tongue firmly in cheek, list tags that didn't make it into HTML 4.0 (e.g., <DOOM LEVEL=number> that blows up your screen if the right keys aren't pressed). On a more practical level, an appendix called "Color on the Web" gives an excellent and understandable explanation of how to use safe colors on Web pages that will display with all browsers.

An excellent replacement for all those old, out-of-date HTML guides (e.g., those purchased in the latter half of 1997!). A highly recommended addition to the web-developer's bookshelf and for libraries with clientele interested in web-authoring guides.

Notes:

[1] For a more extensive and thorough coverage of implementing style sheets, see Håkon Wium Lie and Bert Bos. (1997). Cascading Style Sheets: Designing for the Web. Reading, MA: Addison-Wesley.

Martin R. Kalfatovic (mkalfato@sil.si.edu (mailto:mkalfato@sil.si.edu)) is the Information Access Coordinator for Smithsonian Institution Libraries, Washington, D.C.

Copyright © 1998 by the American Library Association. This document may be reproduced in whole or in part for noncommercial, educational, or scientific purposes, provided that the preceding copyright statement and source are clearly acknowledged. All other rights are reserved. For permission to reproduce or adapt this document or any part of it for commercial distribution, address requests to Office of Rights and Permissions, 50 East Huron Street, Chicago, IL 60611.

[table of contents](#)  ter issues (/lita/publications/archive/ter)

REVIEW OF: James Carlson. PPP Design and Debugging. Reading, MA: Addison-Wesley, 1998.

by Ray Olszewski

Once an arcane protocol known only to the Internet cognoscenti, PPP has become familiar to most of us who use Internet services from home. An acronym for Point-to-Point Protocol, PPP is the most common standard for full-service Internet access by computers connecting to Internet Service Providers (ISP) via dial-up modem connections. Using PPP, homes and small businesses can access email, the World Wide Web, telnet, ftp, and the full range of Internet services.

The PPP standard, however, supports more than slow-speed modem access to the Internet. Designed to transport IP datagrams (and datagrams of other network-layer protocols, such as Novell Netware's IPX and AppleTalk) over serial lines, it is optimized for use with a wide range of telecommunications services, including ISDN, dedicated ADR circuits--an analog 56 Kbps data line service from PacBell, frame relay, and T-1.

PPP Design and Debugging is a thorough introduction to the details of PPP operation and a good guide to troubleshooting PPP problems. Although an introduction, it is a highly technical one, with little in the way of overview for the non-specialist. It assumes the reader is familiar with the 7-layer OSI Reference Model for networking, understands the relationships among frames, datagrams, and packets, and is comfortable reading hex-coded byte-level listings. For the reader with this level of expertise, Carlson explains clearly how PPP fits into the complex mix of communications layers that support modern computer networking, then documents the three main components of PPP--negotiation, authentication, and connection.

Negotiation, probably the main source of PPP problems, occurs when a host initiates a connection to another host. After the physical connection is made (e.g., the two modems handshake successfully and establish a carrier), the PPP software at each end needs to learn about the software at the other end--what PPP options it supports and the like. Carlson provides detailed documentation of both the method (LCP, or Link Control Protocol, messages) and the current assortment of PPP options available.

Authentication is the second major component of PPP, and it is often a source of problems for dial-up connections (which need to authenticate often, compared to other uses of PPP, such as long-lived connections between routers). Carlson documents the two main methods of authentication, PAP (Password Authentication Protocol) and CHAP (Challenge Handshake Authentication Protocol), providing good details both on how they work and on the relative merits of the two. This comparative evaluation is particularly helpful, since PAP is officially a "deprecated" standard--Internet jargon for a feature that is on its way out of the standard. Since (in my experience) PAP remains the more common of the two authentication standards in actual use, Carlson's extensive coverage of it is a helpful feature. Carlson also covers variants on the two standards, such as MS-CHAP, a version of CHAP promulgated by Microsoft.

One welcome feature of PPP Design and Debugging is the author's ability to balance discussion of how the protocol is supposed to work with practical discussion of how common PPP implementations depart from the standard. His own advice summarizes well the reality of PPP: "Be liberal in what you expect and conservative in what you send...following the protocol rule will allow your implementation to interoperate with flawed peers. There are, sadly, many PPP implementations in the world today that have glaring bugs." (p. 30)

Discussion of actual PPP implementations is clear and detailed, covering the principal software used on most common systems. My review here concentrated on the two implementations I myself am most familiar with--pppd for Unix and the PPP component of Windows 95 networking--and in both cases, his coverage was accurate and informative. Carlson also explains clearly the ways in which a protocol can affect, and itself be affected by, the performance of the network protocols at the next level up (e.g., IP, IPX) and the next level down (e.g., RS232, V.35). Here he identifies not only the optimizations made to PPP but also some of its weaknesses, particularly in carrying network-layer protocols other than IP.

Good as the book is, it does have its limitations. One is the relative scarcity of code examples. I consistently find the best way to understand complex protocols to be through examination of a rich assortment of examples. Carlson's use of state diagrams to clarify the operation of the protocol is an excellent approach--I wish more authors would employ it--but it would be even better if coupled with more examples. Aside from two extended examples in C and an occasional bit of pseudocode, examples are almost completely neglected in the design portion of the presentation.

Examples of the protocol itself in action are more plentiful, and they serve their intended purpose of connecting the abstract discussion to the actual transmission of bytes between the two hosts involved in negotiating and authenticating. They are not sufficiently plentiful, though, to illustrate the full range of possibilities--in particular, examples of unsuccessful negotiation and authentication are almost entirely absent from the text.

Examples in the debugging section have these same strengths and weaknesses. The author spends a lot of time discussing examination of "traces" to identify problems, including both byte-level examples and commented log-file examples for eight actual software implementations of PPP. But here too, the examples are always reports of successful connections, not illustrations of the kinds of problems that one might encounter and the evidence they would leave in the logs. The general discussion of the kinds of problems one might encounter is very good, but examples of log files that show the indications of the problems would have been even better.

Like any Internet protocol, PPP has as its official documentation a set of reports known in Netspeak as RFCs (Request For Comment)--a name that is not very descriptive of their documentation function. RFCs evolve as a protocol is being developed, and they are usually extremely difficult to interpret, serving as a barrier to understanding by all but the most expert. All too often, Carlson refers the reader to the relevant RFCs for a "complete" explanation, instead of doing the full job of substituting a readable, organized presentation for this difficult source material.

So, who is this book for? Its technical content is high and demanding--good writing can help the reader understand complexity, but it cannot substitute for the needed technical background. PPP Design and Debugging is definitely for the techies, including programmers writing PPP software and sysadmins who need to implement and troubleshoot support for PPP access to their LANs. Despite the book's real limitations--it could easily have been half again as long without wasting paper, it is a valuable resource for those with these technical needs. For this audience, I recommend it highly.

Ray Olszewski (ray@comarre.com (mailto:ray@comarre.com)) is a consulting economist and statistician. He spent three years as Network Manager at The Nueva School, a private K-8 school in Hillsborough, California. His work includes development of custom Web-based software to support online research.

Copyright © 1998 by Ray Olszewski. This document may be reproduced in whole or in part for noncommercial, educational, or scientific purposes, provided that the preceding copyright statement and source are clearly acknowledged. All other rights are reserved. For permission to reproduce or adapt this document or any part of it for commercial distribution, address requests to the author at ray@comarre.com (mailto:ray@comarre.com).

[table of contents](#)  ter issues (/lita/publications/archive/ter)

REVIEW OF: Cass R. Lewart. The Ultimate Modem Handbook: Your Guide to Selection, Installation, Troubleshooting, and Optimization. Upper Saddle River, NJ: Prentice Hall, 1998.

by Glenda Slaughter

The author presents this book to the reader from the view point that an informed consumer will purchase the modem best suited for the operation. Although the author felt this book would be useful for the basic computer user, I believe the typical reader would have put the book down at the introduction. This book would be appropriate for the advanced reader.

Each section has an introduction for those who scan through books looking for specific information. This can be a useful tool, as the book is packed full of technical and background information, electronic engineering tools, methodology, tables, charts, graphs, schematics, pictures, and screen shots to help the reader grasp the concepts.

The introduction explains where the word modem originated--from the combination of MOdulator and DEModulator. The author also points out the fact that modems not only are for point-to-point information transmission, but also can be used for ISDN (Integrated Service Digital Network) lines or Dataphone Digital Service (DDS) lines.

Part One encompasses chapters one through six. The author explains the purpose of a modem--to transmit data from the sender to the receiver. There is a review of the problems with the transmission of data based on our current technology--telephone lines are mostly analog and computers are digital. Since the signals are different, computers cannot transmit over analog lines. This spurred the creation of the modem that allows transmission of digital data over analog lines.

The advancement in telephone services from analog to digital is discussed. Data communication terms include voice band; transmission medium; two- and four-wire transmission; asynchronous and synchronous operation; transmission impairments; full-duplex, half-duplex, and simplex operation; and digital information transmission. The telephone/voice network known as Public Switched Telephone Network (PSTN) is covered. The author gives a description, a definition, frequency charts, and electronic diagrams. The seven layers of the Open System Interconnection (OSI) model are defined. A short explanation of industry standards is covered including how deregulation made this movement necessary.

The speed limitation of the PSTN is discussed. The author uses Nyquist theorem and Baud to explain the channel bandwidth equation and then moves to the evolution of T1 digital carrier systems with an explanation of the measurement of modem speed. Modulation techniques are described with examples of the differences among each including Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM), Differential Phase-Shift Keying (DPSK), Quadrature Amplitude Modulation (QAM), and Trellis Modulation. The Bit Error Rate (BER) calculation is also presented.

The author discusses data communications protocols. A detailed list of the standards of the International Telecommunications Union - Telecommunications Standardization's Sector (ITU-T) is offered. Twelve formulas are used to determine the transmit time of a file and the data compression and error detection rate. Fax transmissions and standards are covered including the two class protocols, the differences among the four different group fax protocols, and V-Series Fax Protocols. The ten levels of Microcom Network Protocols (MNP) are also reviewed.

Asynchronous and synchronous methods of transmission are reviewed, charted, and explained, along with some common hardware or software problems. Serial interfaces such as RS-232-C are reviewed. Charts of the connector itself and pin-in/pin-out mappings and signals are explained. An external modem connected via a serial port is described from the pin assignments to how the computer/modem communication is established. Connecting two computers using a null modem cable and cheater cable is discussed. Other serial interfaces are explained using charts and graphics. Seven different interface converters are compared.

Part Two includes chapters seven through twelve. The author gives a summary of the upcoming section and an overview of solutions for a few unique connectivity problems. This section focuses on helping the reader decide which is the best modem.

Internal and external modems with and without the fax feature are reviewed. There are many pictures, figures, and diagrams along with a list of pros and cons for each type of modem. Some of the features discussed include power supplies, cabling, installation, serial ports, card slots, indicator lights, portability, power switches, and cost. Fax modems are discussed briefly. Additional modem features are presented: rotary dial versus touch-tone, full-duplex, Hayes compatibility, automatic answer, answer mode, speed select, tone recognition, speakers, error detection and correction, data compression, memory, telephone jacks, FCC approvals, transmission rates, COM port capability, IRQs, EPROMs, testing, size, caller-id, and software.

The author explains other problems that may arise because of the quality of the telephone line or the Internet Service Provider (ISP). Installation of the modem is covered including a detailed explanation of each of the options listed previously. Helpful hints, monitoring the modem's performance, and a schematic are included. Use of a switch box is illustrated with a picture and a diagram.

Further detailed information and diagrams about modem operation are included. There is a short explanation of the four different operation modes: local, handshake, online, and offline. Configuring Hyper Terminal in Windows 95, the use of the ATi7 commands, and a review of flow control are covered. The origins of AT commands and the different categories are discussed. There is a description of several AT commands including a table listing the commands, their associated parameters, and the result codes. The author explains how the program works with an example from the program itself. A description of the S registers includes a chart of the registers, their defaults values, and acceptable ranges.

Terminal emulation programs covered include Terminal, Hyper Terminal, and Smartcom for Windows. Both menu-based and command-driven interfaces are discussed along with an example startup sequence. The advantages of command and script files are noted. Information on fax and Optical Character Recognition (OCR) software using both WinFax and Omni Page is included.

The author covers the characteristics of the Internet and the use of browsers. The differences between browsers and terminal emulation software are discussed. Background information on browser and web page development using HyperText Markup Language (HTML) is reviewed. Windows socket interface, Transmission Control Protocol/Internet Protocol (TCP/IP), Serial Line Internet Protocol (SLIP), and Point-to-Point Protocol (PPP) are covered. Setup procedures for connecting to the Internet are reviewed using TCP/IP on a Windows 95 system.

The author reviews the use of voice over the Internet. Using CoolTalk and Internet Phone while connecting to a Chat Room is discussed including system requirements. Further information on ISPs is presented. Instructions for signing onto UNIX systems and some UNIX commands and procedures are discussed. File Transfer Protocols (FTP) is covered in detail. The use of Cyclical Redundancy Check (CRC) algorithm is included. Protocols covered include Xmodem, X.PC, Ymodem, Kermit, Zmodem, and Microcom Network Protocols (MNP). Compression, encoding, decoding, and data encryption are reviewed.

The author provides a complete walk through of electronic bulletin boards using WILDCAT! software: logging in, downloading a file, and logging out. The author also lists some examples of bulletin boards that connect to worldwide networks. The discussion of single location services, such as bulletin boards, changes to commercial global services, such as on-line service providers, and specialized services, such as search services. Telecommuting is mentioned along with how to configure the modem to talk to mainframes using synchronous originate mode. The author then addresses the topic of the Internet: how the World Wide Web (WWW) originated, the creation of web pages using HTML, how to complete a search via Yahoo!'s search engine, and a little on Gopher's capabilities.

Email is discussed. The author explains addresses, attachments, address books, replying to a message, signature blocks, and offline email. What to expect with ftp is discussed using an example session with WS_FTP. UseNet is described with examples of its use and a table with keyword searches using USENET.EXE. Chat Groups, or Internet Relay Chart (IRC), are also covered with an example and a list of the commands.

The author covers the internal workings of a modem. The three designs of modem chips are briefly discussed. The Rockwell International Corporation RC chip set is described. Protocols supported by the RC chip are listed along with a diagram and the chip set interfaces. Chip sets listed include modem data pump (MDP), microcontroller (MCU), and compression expansion processor (CEP). Chip set interfaces described include parallel, V.24 serial, indicator output, NVRAM, speaker, external bus, telephone line, business audio, and eye-pattern generator. Modem building blocks are used to explain how modems perform different functions: digital signal processor, integrated analog device, data input control, asynchronous to synchronous converter, scrambler, encoder and signal point ROM, modulator and low-pass filter, band-pass filter and D/A converter, compromise equalizer, adaptive equalizer, tone dialer, call-progress tone detector, and data access arrangement (DAA). The author presents a complete block diagram, signal path, and schematic for a modem. Commands for the RC chip are listed: AT, MNP 10, fax modem, audio, world class, and register.

Part Three encompasses chapters thirteen through fifteen. This section discusses the pros and cons of the three types of communication services: switched, hybrid, and leased. Tables and figures are included.

Bell and ITU-T commercial modem standards are charted and reviewed along with a description of low-speed voice-band commercial modems. Modem standards and implementations covered are Bell 103, 212 202, 201, 208, 209, and ITU-T V.26, V.27 bis, V.27 ter, V.29, V.33. More information on modem setup including wire/carrier, fallback, transmit level, carrier detect level, anti-stream timer, echo-suppressor disabler, signal-quality, dial backup, and modem address is presented. The physical connectivity at high transmission rates (e.g., ISDN, cable, Local Area Networks (LAN), wireless, cellular, and 56k modems) is covered. ISDN technology is reviewed: what to purchase, software, the ISDN terminal adapter (TA), and how to connect the computer.

Cable modem service from cable television (CATV) providers is described. The features and interface specifications (including the RF and receiver specifications of the CyberSURFR cable modem) are reviewed. LAN modems are also discussed. The specifications for the Xircom Ethernet modem and the CreditCard Token Ring with 33.6 modem are listed.

Wireless modems are discussed. The author includes several examples of wireless connectivity such as cellular phones, small radio frequency transceivers, wireless data networks using RAM Mobile Data Networks and Ardis Network, and point-to-point using a wireless transmitter/receiver. The author details the specifications for one wireless modem, GINA 5000N. Cellular modems are also discussed indicating which phones support this feature and how the whole system works.

The technology of 56k modems is explained. Specifications, distance, applications, hook-up, features, and disadvantages of limited-distance modems (LDM) are reviewed. LRM-1 and Motorola DA 56 DSU/CSU devices serve as examples of point-to-point communication. Fiber optics applications and AC modems are also reviewed. Figures illustrate the design and use of these modems.

Part Four includes chapters sixteen and seventeen. This section reviews the components of a data communications system and methods for diagnosing problems. Modem indicator lights are explained in relation to problem solving. Techniques, such as the &T commands, for solving data communication problems are presented. Each &T command is listed and described.

Specialized equipment is also reviewed and demonstrated (e.g., Telecom Analysis System Inc. (TAS) line simulators for load tests and break-out boxes for RS-232-C signals). A home-built break-out box and a commercial version are described. The indicator lights are defined and explained along with examples of how to solve problems. Protocol analyzers and modem test software are included as well.

After testing the modem hardware and software, the author directs the reader to additional problems that may be encountered. These problems include telephone lines, transmission parameters, attenuation distortion, delay distortion, noise, phase jitter, and eye pattern. Each of these are explained along with examples and figures. Specialized transmission measurement processes are reviewed illustrated with Hewlett Packard's HP4934A Transmission Impairment Measuring Set (TIMS) and Bit Error Rate Test set (BERT). Telephone line and modem testing using the U.S. Robotics BBS is described, and an example is given including sample problems and resolutions.

Part Five is chapter eighteen--a prediction of what the future has in store for data transmission. This author reviews several trends: the move from modems to multiplexers, the need for faster modems to keep up with computer processor speeds, application requirements, lower prices, and improved subscriber loops. The author views Asymmetric Digital Subscriber Line (ADSL) as a wave of the future provided demand increases to lower costs. Expected performance, capabilities, technology changes, standards, and past market analysis of ADSL are covered.

Very High Rate Digital Subscriber Line (VDSL) is the author's second choice. Projected capabilities, technology, channel separation, upstream multiplexing, issues, and standards status are covered. Proposed line codes discussed include Carrier-less AM/PM (CAP), Discrete Multi-Tone (DMT), Discrete Wavelet Multi-Tone (DWMPT), and Simple Line Code (SLC). The author ends with a brief overview and a comparison of ADSL and VDSL. Although VDSL is faster than ADSL, ADSL has a larger range than VDSL. A brief review of the differences between network computers (NC) and personal computers (PC) finishes the book.

Appendix A covers Internet addresses for modem resources. Appendix B lists different modem hardware and software manufacturers names, phone numbers, and bulletin board numbers. Appendix C defines the ASCII codes in binary, hex, and character. There is a glossary and an index at the end of the book. The glossary contains 41 definitions. The words defined are those one would use to configure a modem. I found it interesting that the word modem is not listed. The index is very brief covering only four pages. Major topics covered in the text are listed. An included CD ROM contains WhatCom and UseNet DOS-based software.

Glenda Slaughter (Wolf@swlink.net (mailto:Wolf@swlink.net)) is the System Administrator for Oracle at Motorola in Scottsdale, Arizona.

Copyright © 1998 by Glenda Slaughter. This document may be reproduced in whole or in part for noncommercial, educational, or scientific purposes, provided that the preceding copyright statement and source are clearly acknowledged. All other rights are reserved. For permission to reproduce or adapt this document or any part of it for commercial distribution, address requests to the author at Wolf@swlink.net (mailto:Wolf@swlink.net).

[table of contents](#)  ter issues (/lita/publications/archive/ter)

About TER