The Experimental Literature of The Internet: An Annotated Bibliography

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Abstract

The DARPA Internet is the most successful experiment in heterogeneous internetworking. It connects computer systems from almost every major vendor, using a wide variety of wide-area and local-area network technology, and is in continual use by thousands of people. This annotated bibliography covers the literature of the Internet as an experiment: publications which convey the experience acquired by the experimenters.

1. Introduction

The DARPA Internet is the most successful experiment in heterogeneous internetworking. It connects computer systems from almost every major vendor, using a large variety of wide-area and local-area network technology. The Internet has continually evolved over more than a decade, and is in continual use by thousands of people, most of whom view it as a resource rather than an experiment. For these reasons, it has produced a lot of hard-won experience on how to construct, and on how not to construct, a large heterogeneous internet.

The experience gained from the Internet is its most important experimental result. It has proven hard to transfer this experience to other researchers and practitioners, with the result that many of them must learn the same lessons, often in contexts (such as commercial installations or international standards) where it is much more difficult to change course. Many people have learned the lessons of the Internet by being involved in its operation, but many more people can only learn these lessons by reading about them.

It is far harder to convey experience in written form than it is to convey, say, analytical studies of access methods or proposals for protocols. Perhaps this is because it takes much longer to conduct an experiment, especially one as large as the Internet. It is harder come to a simple conclusion, if only because simple conclusions often melt when faced with real experience. Finally, experience (especially when not quantitative) seems less ‘‘scientific’’ than more formal publications.

But computer science is an experimental science, and there is a wealth of experimental literature on the Internet. Some of this covers the design and use of the Internet Protocol (IP) family; some covers the implementation and performance of the IP protocols; some covers the problems involved in constructing a large heterogeneous internet. This literature is often buried in the larger flood of publications concerning computer communication, so it is not easily available to someone unfamiliar with the field.

2. Selection Criteria and Annotations

This annotated bibliography is an attempt to sift out the literature of the Internet as an experiment: those publications which convey the experience acquired by the experimenters. There have been other bibliographies covering computer networking (for example, Shoch [6], Ananda and Srinivasan [1]), and there are some that cover mostly informally published documents [3, 5]. This is the first bibliography to concentrate on the experimental results of the Internet.

I have tried to include mostly formally published works. The primary documentation for the IP protocols and the Internet, of course, are the ‘‘Request For Comments’’ (RFC) documents available as technical reports from the Network Information Center at SRI International. Very few of these, however, convey experimental results; most propose or elucidate standards. I have included a few RFCs that do present interesting results.

The bulk of the publications included are those from the more formal literature, ranging from refereed journals and conference proceedings to the unrefereed publications of scientific societies. For the most part, I have avoided the trade press.

I cannot claim to have discovered all of the relevant literature. I started with what I was already familiar with, scanned tables of contents and other bibliographies, and solicited suggestions from the Internet community. Undoubtedly I have ignored certain publications that either were not available to me, or whose titles did not entice me to read further. I have also been somewhat arbitrary in choosing to include or exclude literature that fell on the borderline.

Most of the entries are accompanied by brief annotations on their content. When possible, these are my own comments, and I take full responsibility for oversimplifying or distorting the results of the publication.

Acknowledgements

The following people made helpful suggestions of things to include: Len Bosack, Lillian Cassel, Marlyn Johnson, Chris Kent, Craig Partridge, Gurudatta Parulkar, Greg Satz, Karen Seo, and Charles Spurgeon. I also made heavy use of the bibliographies of books by Douglas Comer [2] and Craig Partridge [4].

References

[1] A. L. Ananda and B. Srinivasan.
An Extensive Bibliography on Computer Networks.
Computer Communication Review 13(5):78-98, January/April, 1984.

[2] Douglas E. Comer.
Internetworking with TCP/IP: Principles, Protocols, and Architecture.
Prentice-Hall, New Jersey, 1988.

[3] Network Information Center, SRI International.
Background Reading.
Online document.
November, 1987.
File name ‘NETINFO:TCP-IP-BIB.TXT’ on host SRI-NIC.ARPA.

[4] Craig Partridge (editor).
Innovations in Internetworking.
Artech House, Norwood, MA, 1988.

[5] Joyce K. Reynolds and Jonathan B. Postel.
Bibliography of Requests for Comments 1 through 999.
RFC 1012, Network Information Center, SRI International, June, 1987.

[6] John F. Shoch.
An Annotated Bibliography on Local Computer Networks.
SSL 79-5, Xerox Palo Alto Research Center, October, 1979.

3. Bibliography

[1] L. Aguilar, J. J. Garcia-Luna-Aceves, D. Moran, E. Craighill, and R. Brungardt.
An Architecture for a Multimedia Teleconferencing System.
In *Proc. SIGCOMM '86 Symposium on Communications Architectures and Protocols*, Pages 126-136. Stowe, VT, August, 1986.

Describes a conferencing system, including a discussion of the performance of several transport protocols.

[2] Paul D. Amer, Ram N. Kumar, Ruey-bin Kao, Jeffrey T. Phillips, and Lillian N.Cassel.
Local Area Broadcast Network Measurement: Traffic Characterization.
In *Proc. Spring COMPCON*, Pages 64-70. IEEE Computer Society, San Francisco, CA, February, 1987.

Presents observations of traffic patterns on a LAN where IP protocols are in moderate use.

[3] Geoff Arnold.
Internet Protocol Implementation Experiences in PC-NFS.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology*, Pages 8-14. Stowe, VT, August, 1987.

A case study in implementing a set of Internet protocols on a PC.

[4] Lewis Barnett and Michael K. Molloy.
ILMON: A UNIX Network Monitoring Facility.
In *Proc. Winter 1987 USENIX Conference*, Pages 133-144. Washington, D.C., January, 1987.

Describes a LAN monitoring system and some of the results observed.

[5] Eric Benhamou.
Integrating Bridges and Routers in a Large Internetwork.
IEEE Network Magazine 2(1):65-71, January, 1988.

Tradeoffs between using bridges and using routers.

[6] Howard Salwen, Richard Boule, and J. Noel Chiappa.
Examination of the Applicability of Router and Bridging Techniques.
IEEE Network Magazine 2(1):77-80, January, 1988.

Tradeoffs between using bridges and using routers.

[7] Brian N. Bershad, Dennis T. Ching, Edward D. Lazowska, Jan Sanislo, and Michael Schwartz.
A Remote Procedure Call Facility for Heterogeneous Computer Systems.
Technical Report 86-09-10, Department of Computer Science, University of Washington, September, 1986.

Describes an RPC mechanism with both UDP-based and TCP-based implementations.

[8] James M. Bloom and Kevin J. Dunlap.
Experiences Implementing BIND, A Distributed Name Server for the DARPA Internet.
In *Proc. Summer 1986 USENIX Conference*, Pages 172-181. Atlanta, GA, June, 1986.

Describes the design decisions and problems encountered during the implementation of the most widely used Domain Name server; see also [73, 95, 102].

[9] Leonard Bosack and Charles Hedrick.
Problems in Large LANs.
IEEE Network Magazine 2(1):49-56, January, 1988.

A compendium of experience in building and maintaining large LANs.

[10] Robert K. Brandiff, Clifford A. Lynch, and Mark H. Needleman.
Development of a TCP/IP for the IBM/370.
In *Proc. 9th Data Communications Symposium*, Pages 2-8. Whistler Mountain, B.C., September, 1985.

A case study in implementing a set of Internet protocols on a mainframe.

[11] Luis-Felipe Cabrera.
Improving network subsystem performance in a distributed environment.
RJ 5719, IBM Research Division, June, 1987.

A performance assessment methodology, and a case study of its use in measuring the performance differences in networking code between 4.2BSD and 4.3BSD.

[12] Luis-Felipe Cabrera, Edward Hunter, Michael J. Karels, and David A. Mosher.
User-process Communication Performance in Networks of Computers.
IEEE Transactions on Software Engineering SE-14(1):38-53, January, 1988.

Extensive measurements of the performance of the IP implementation in 4.2BSD UNIX on a LAN, showing the effect of processor speed, interface hardware, network technology, and processor and network loads.

[13] Luis Felipe Cabrera, Michael J. Karels, David Mosher.
The impact of buffer management on networking software performance in Berkeley UNIX 4.2BSD: a case study.
UCB/CSD 85/247, Computer Science Division, University of California, Berkeley, 1985.
(Also in *Proc. Summer 1985 USENIX Conference*.).

Detailed measurements showing the effects of kernel buffer management strategies on protocol performance.

[14] Jeffrey D. Case, James R. Davin, Mark S. Fedor, and Martin L. Schoffstall.
Introduction to the Simple Gateway Monitoring Protocol.
IEEE Network Magazine 2(2):43-49, March, 1988.

The design and implementation of, and experience with, a monitoring and management protocol for Internet gateways.

[15] David R. Cheriton.
VMTP: A Transport Protocol for the Next Generation of Communication Systems.
In *Proc. SIGCOMM '86 Symposium on Communications Architectures and Protocols*, Pages 406-415. Stowe, VT, August, 1986.

Describes a transport protocol designed for high-performance distributed systems.

[16] David R. Cheriton.
Exploiting Recursion to Simplify RPC Communication Architecture.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

An analysis of the conceptual complexity of certain layers of the Internet protocol hierarchy, and a proposal to reduce the complexity through the use of recursion.

[17] David R. Cheriton and Stephen E. Deering.
Host Groups: A Multicast Extension for Datagram Networks.
In *Proc. 9th Data Communications Symposium*, Pages 172-179. ACM/IEEE, Whistler Mountain, B.C., September, 1985.

A preliminary attempt to integrate multicasting into the Internet.

[18] Greg Chesson.
Interview with Vint Cerf.
Unix Review 5(1):60-82, January, 1987.

A spirited interview between one of the principal architects of the Internet and a sometime critic. Covers some of the history behind the design of Internet, prospects for future protocols, and the state of OSI.

[19] Greg Chesson.
Protocol Engine Design.
In *Proc. Summer 1987 USENIX Conference*, Pages 209-215. Phoenix, AZ, June, 1987.

A proposal to implement a transport protocol in hardware to avoid alleged performance defects of software implementations of IP and TCP.

[20] David D. Clark.
The Structuring of Systems Using Upcalls.
In *Proc. 10th Symposium on Operating Systems Principles*, Pages 171-180. Orcas Island, WA, December, 1985.

Describes a way of structuring layered implementations to reduce the use of asynchronous messages.

[21] David D. Clark.
Some Thoughts on the DARPA Internet Architecture.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

A look back at the Internet architecture by one of its chief architects, explaining the reasoning behind some of the choices, and clarifying the packet-switch vs. circuit-switched argument.

[22] David D. Clark, Mark L. Lambert, and Lixia Zhang.
NETBLT: A High Throughput Transport Protocol.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology*, Pages 353-359. Stowe, VT, August, 1987.

An analysis of why protocols resembling TCP perform poorly over paths with a high delay-bandwidth product, and preliminary results with a new protocol that appears to do better; see also [57].

[23] Douglas Comer.
The Computer Science Research Network CSNET: A History and Status Report.
Communications of the ACM 26(10):747-753, October, 1983.

Presents the early history history of CSNET, focusing on policy and organizational (rather than technical) issues.

[24] Douglas E. Comer.
Domain Names: Hierarchy in Need of Organization.
In *Proc. 9th Data Communications Symposium*, ACM/IEEE, Whistler Mountain, B.C., September, 1985.

(Abstract for panel session) A discussion of problems in creating a name service hierarchy.

[25] Douglas E. Comer.
Operating System Design. Volume II: *Internetworking with Xinu.*
Prentice-Hall, New Jersey, 1987.

Essentially an annotated source-code listing of a partial IP implementation; a useful reference.

[26] Douglas E. Comer.
Internetworking with TCP/IP: Principles, Protocols, and Architecture.
Prentice-Hall, New Jersey, 1988.

An explication of the IP, TCP, and related protocols; the RFCs treated as a textbook. Warning: lots of little errors.

[27] Douglas E. Comer and John T. Korb.
CSNET Protocol Software: The IP-to-X.25 Interface.
In *Proc. SIGCOMM '83 Symposium on Communications Architectures and Protocols,* Pages 154-169. Austin, TX, March, 1983.

Describes the technical issues involved in building software to interface IP and X.25, to allow IP to be used across public data networks.

[28] Douglas E. Comer and John T. Korb.
The proposed DARPA IP to X.25 interface standard: performance optimization with multiple circuits.
CSD TR 473, Department of Computer Sciences, Purdue University, May, 1984.

Describes experiments that pointed out serious bottlenecks in using X.25 for datagram communication. Dramatic performance improvements were obtained by multiplexing over multiple virtual circuits.

[29] Douglas Comer and Thomas Narten.
UNIX Systems as Cypress Implets.
In *Proc. Winter 1988 USENIX Conference*, Pages 55-62. Dallas, TX, February, 1988.

A case study in the implementation of gateways for a wide-area IP network.

[30] Douglas E. Comer, Thomas Narten, and Rajendra Yavatkar.
The Cypress Network: A Low-Cost Internet Connection Technology.
TR 653, Purdue University, April, 1987.

A history and overview of Cypress, intended to provide a low-cost technology for star-topology internet networks.

[31] D. E. Comer and L. L. Peterson.
Issues in Using DARPA Domain Names for Computer Mail.
In *Proc. 9th Data Communications Symposium,* Pages 158-164. ACM/IEEE, Whistler Mountain, B.C., September, 1985.

Theory and practice of applying Domain Names to computer mail. Argues against binding domain names directly to mailboxes.

[32] Stephen E. Deering.
Multicast Routing in Internetworks and Extended LANs.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

An analysis of a variety of algorithms for routing multicasts in the Internet.

[33] C. Anthony DellaFera, Mark W. Eichin, Robert S. French, David C. Jedlinksy, John T. Kohl, William E. Sommerfield.
The Zephyr Notification Service.
In *Proc. Winter 1988 USENIX Conference*, Pages 213-221. Dallas, TX, February, 1988.

Describes a notification service, with much lower latencies than for electronic mail, based on UDP.

[34] Peter J. Denning, Anthony Hearn, and C. William Kern.
History and Overview of CSNET.
In *Proc. SIGCOMM '83 Symposium on Communications Architectures and Protocols*, Pages 128-145. Austin, TX, March, 1983.

Presents the early history history of CSNET, focusing on policy and organizational (rather than technical) issues.

[35] J. J. Dongarra and E. Grosse.
Distribution of Mathematical Software via Electronic Mail.
Communications of the ACM 30(6):403-407, May, 1987.

Describes how *netlib* software has been made available throughout the Internet (and beyond) via an automated electronic-mail based system.

[36] Deborah Estrin.
Inter-Organization Networks: Implications of Access Control Requirements for Interconnection Protocols.
In *Proc. SIGCOMM '86 Symposium on Communications Architectures and Protocols*, Pages 254-264. Stowe, VT, August, 1986.

A discussion of the problems that arise when different organizations are connected into internetworks. Proposes several solutions to the problem of access control.

[37] D. Farber and L. Cassel.
Some Observations on the Performance of a 56 Kbit Internet Link.
Computer Communication Review 17(1/2), January/April, 1987.

Discusses the performance problems observed when sharing a slow link between large and small flows.

[38] Metin Feridun, Melisse Leib, Mark H. Nodine, and James C. Ong.
ANM: Automated Network Management System.
IEEE Network Magazine 2(2):13-19, March, 1988.

The design of, and early experience with, a network management system based on artificial intelligence techniques.

[39] Gregory G. Finn.
Routing and Addressing Problems in Large Metropolitan-scale Internetworks.
ISI/RR 87-180, Information Sciences Institute, University of Southern California, March, 1987.

Extrapolates from experience with the Internet to predict the problems associated with routing in large metropolitan-area networks; proposes new addressing and routing mechanisms.

[40] Ed Gould.
The Network File System Implemented on 4.3BSD.
In *Proc. Summer 1986 USENIX Conference*, Pages 294-305. Atlanta, GA, June, 1986.

A case study in the implementation of NFS.

[41] Daniel B. Grossman.
Comments on ‘‘Congestion control in TCP/IP internetworks’’.
Computer Communication Review 15(2):3-7, April/May, 1985.

Asserts that the problems noted in [67] are inherent in packet-switched networking.

[42] Riccardo Gusella.
The Analysis of Diskless Workstation Traffic on an Ethernet.
Technical Report UCB/CSD 87/379, Computer Science Division, University of California, Berkeley, November, 1987.

Reports on observations of LAN traffic patterns, on a heavily used IP-based network.

[43] Robert Hinden, Jack Haverty, and Alan Sheltzer.
The DARPA Internet: Interconnecting Heterogeneous Computer Networks with Gateways.
IEEE Computer Magazine 16(9):38-48, September, 1983.

A report on early experience with the Internet in operation, focusing on network monitoring and management.

[44] Bruce L. Hitson.
Knowledge-Based Monitoring and Control: An Approach to Understanding the Behavior of TCP/IP Network Protocols.
In *Proc. SIGCOMM ’88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

An application of expert-system techniques to the analysis of packet traces, with some success in detecting unusual behavior.

[45] John H. Howard, Michael L. Kazar, Sherri G. Menees, David A. Nichols, M. Satyanarayanan, Robert N. Sidebotham, and Michael J. West.
Scale and Performance in a Distributed File System.
TOCS 6(1):51-81, February, 1988.

Analyses how the performance of the Andrew File System scales for a large number of workstations; compares the performance of the Andrew File System with NFS.

[46] Van Jacobson.
Congestion Avoidance and Control.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

A clear, thorough explanation of how TCP behaves over a congested internet, and a surprisingly simple set of algorithms that yield major performance improvements.

[47] Raj Jain and Shawn Routhier.
Packet Trains: Measurements and a New Model for Computer Network Traffic.
IEEE Journal on Selected Areas in Communication SAC-4(6):986-995, September, 1986.

Based on observations of an IP-based LAN, shows that packet arrival processes are not Poisson; proposes a new model.

[48] John Jubin and Janet D. Tornow.
The DARPA Packet Radio Network Protocols.
Proc. IEEE 75(1):21-32, January, 1987.

Describes the design and implementation of a set of packet radio protocols meant for integration with the Internet.

[49] Michael J. Karels and Marshall Kirk McCusick.
Network Performance and Management with 4.3BSD and IP/TCP.
In *Proc. Summer 1986 USENIX Conference*, Pages 182-188. Atlanta, GA, June, 1986.

Describes changes between 4.2BSD and 4.3BSD that greatly improved network performance. Also discusses issues concerning the management of hosts and networks.

[50] Phil Karn and Craig Partridge.
Improving Round-Trip Time Estimates in Reliable Transport Protocols.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology*, Pages 2-7. Stowe, VT, August, 1987.

An analysis of TCP round-trip time estimation, and new algorithms that yield better estimates than the standard algorithm; see also [60, 101].

[51] Philip R. Karn, Harold E. Price, and Robert J. Diersing.
Packet Radio in the Amateur Service.
IEEE Journal on Selected Areas in Communication SAC-3(3):431-439, May, 1985.

Hardware, software, protocol design, and early experience with a system that was later used in the Internet.

[52] Alan R. Katz.
An experimental internetwork multimedia mail system.
ISI/RS 84-134, Information Sciences Institute, University of Southern California, June, 1984.

Design of and experience with a multimedia mail system.

[53] Christopher A. Kent and Jeffrey C. Mogul.
Fragmentation Considered Harmful.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology,* Pages 390-401. Stowe, VT, August, 1987.

An analysis of how packet fragmentation can lead to poor throughput or loss of connections, with a variety of suggestions on how to avoid these problems.

[54] Charley Kline.
Supercomputers on the Internet: A Case Study.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology*, Pages 27-33. Stowe, VT, August, 1987.

A case study in implementing a set of Internet protocols on a supercomputer.

[55] L. J. Konopelski.
Implementing Internet remote login on a personal computer.
MIT/LCS/TM 233, Laboratory for Computer Science, Massachusetts Institute of Technology, 1982.

[56] John T. Korb and Craig E. Wills.
Command Execution in a Heterogeneous Environment.
In *Proc. SIGCOMM '86 Symposium on Communications Architectures and Protocols*, Pages 68-74. Stowe, VT, August, 1986.

Describes a remote command execution mechanism using UDP for setup and TCP for data transfer.

[57] Mark L. Lambert.
On Testing the NETBLT Protocol over Divers Networks.
RFC 1030, Network Information Center, SRI International, November, 1987.

Performance measurements of several NETBLT implementations over several LANs and a satellite network; see also [22].

[58] L. Landweber, M. Litzkow, D. Neuhengen, and M. Solomon.
Architecture of the CSNET Name Server.
In *Proc. SIGCOMM '83 Symposium on Communications Architectures and Protocols*, Pages 146-153. Austin, TX, March, 1983.

Describes the CSNET Name Server, used to map user names to mailbox names, and intended to free users from having to understand the complexities of mail addressing.

[59] Keith A. Lantz, William I. Nowicki, and Marvin M. Theimer.
An Empirical Study of Distributed Application Performance.
IEEE Transactions on Software Engineering SE-11(10):1162-1174, October, 1985.

An empirical study of the factors affecting distributed application performance. Compares various transports, including TCP.

[60] David Mills.
Internet Delay Experiments.
RFC 889, Network Information Center, SRI International, December, 1983.

A survey of round-trip delays between a large number of hosts on the Internet, together with some suggestions for improving TCP round-trip time estimators; see also [50, 101].

[61] David Mills.
Experiments in Network Clock Synchronization.
RFC 957, Network Information Center, SRI International, September, 1985.

Reports on experiments in clock synchronization between hosts in the Internet. Shows how reference clock hardware and path delays affect the accuracy of synchronized clocks.

[62] David L. Mills.
The Fuzzball.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

A description of a ''network building block'' implementation which saw wide service as a gateway, together with the results of several experiments in protocol design and implementation.

[63] David L. Mills and Hans-Werner Braun.
The NFSNET Backbone Network.
In *Proc. SIGCOMM '87 Workshop on Frontiers in Computer Communications Technology*, Pages 191-196. Stowe, VT, August, 1987.

A description of the NSFNET backbone, including observations of its performance before and after certain gateway policy changes.

[64] Paul V. Mockapetris.
Development Of The Domain Name System.
In *Proc. SIGCOMM '88 Symposium on Communications Architectures and Protocols*, Stanford, CA, August, 1988.

The history and rationale behind the Domain Name system.

[65] James H. Morris, Mahadev Satyanarayanan, Michael H. Conner, John H. Howard, David S. H. Rosenthal, and F. Donelson Smith.
Andrew: A Distributed Personal Computing Environment.
Communications of the ACM 29(3):184-201, March, 1986.

A overview of the Andrew system, including a discussion of its IP-based communication and file systems.

[66] R. L. Murphy.
Comparing the Efficiency of the Internet Protocols to DECNET.
In *Proc. Winter 1988 USENIX Conference*, Pages 105-110. Dallas, TX, February, 1988.

In spite of the title, this paper does not present data comparing the efficiency of the two protocols, but rather showing the performance of a gateway between a low-speed DECNET link and a high-speed IP link.

[67] John Nagle.
Congestion Control in IP/TCP Networks.
Computer Communication Review 14(4):11-17, October, 1984.

An analysis of two problems contributing to congestion in the Internet, together with solutions: ''tinygram'' suppression and the use of Source Quench messages.

[68] John Nagle.
On Packet Switches With Infinite Storage.
IEEE Transactions on Communications COM-35(4):435-438, April, 1987.

Explains how increasing the buffer space in gateways will not solve the congestion problem; proposes ''fair queueing'' as a partial solution.

[69] Michael N. Nelson, Brent B. Welch, and John J. Ousterhout.
Caching in the Sprite Network File System.
TOCS 6(1):134-154, February, 1988.

Shows how caching of file blocks in workstation memories improves the performance of a network file system. Compares Sprite performance with NFS.

[70] Clifford Neuman and Wayne Yamoto.
Adding Packet Radio to the Ultrix Kernel.
In *Proc. Winter 1988 USENIX Conference*, Pages 303-308. Dallas, TX, February, 1988.

A case study in the implementation of a packet radio link for use with IP protocols.

[71] D. Oberst and C. Partridge.
Letter to ACM forum.
Communications of the ACM 30(8), August, 1987.

Corrects a statement in [35]; the *netlib* system is *not* the first automated electronic-mail based retrieval system.

[72] Michael A. Padlipsky.
The Elements of Networking Style and Other Essays and Animadversions on the Art of Intercomputer Networking.
Prentice-Hall, Inc., Englewood Cliffs, New Jersey, 1985.

A extremely personal (some might say unreadable) collection of essays, most severely criticizing the ISO/OSI approach and favoring the Internet model.

[73] Mark Painter.
The design and implementation of a ‘‘domain names’’ resolver.
UCB/CSD 84/176, Berkeley-CSD, May, 1984.

The design, implementation, and performance of a user agent for the Domain Naming system; see also [8, 95, 102].

[74] Craig Partridge.
Mail Routing Using Domain Names: An Informal Tour.
In *Proc. Summer 1986 USENIX Conference*, Pages 366-376. Atlanta, GA, June, 1986.

A discussion of how the Domain Naming system is used in common by the Internet, BITNET, CSNET, and the UUCP network.

[75] Craig Partridge.
Implementing the Reliable Data Protocol (RDP).
In *Proc. Summer 1987 USENIX Conference*, Phoenix, AZ, June, 1987.

A case study in high-performance protocol implementation.

[76] Craig Partridge.
A UNIX Implementation of HEMS.
In *Proc. Winter 1988 USENIX Conference*, Pages 89-96. Dallas, TX, February, 1988.

Experience with the first implementation of the ‘‘High-Level Entity Management System’’ (for network management).

[77] Guru Parulkar and Jonathan S. Turner.
Towards a Framework for High Speed Communication in a Heterogeneous Networking Environment.
Technical Report WUCS-88-7, Dept. of Computer Science, Washington University, 1988.

Discusses limitations of the current Internet and proposes a revised internet model.

[78] L. L. Peterson.
Domain Names: More Questions Than Answers.
In *Proc. 9th Data Communications Symposium*, ACM/IEEE, Whistler Mountain, B.C., September, 1985.

(Abstract for panel session) A discussion of problems with the Domain Naming architecture.

[79] Jonathan B. Postel, Gregory G. Finn, Alan R. Katz, and Joyce K. Reynolds.
The ISI experimental multimedia mail system.
ISI/RR 86-173, Information Sciences Institute, University of Southern California, September, 1986.

Describes the implementation of a multimedia mail system.

[80] J. S. Quarterman and J. C. Hoskins.
Notable Computer Networks.
Communications of the ACM 29(10):932-971, October, 1986.

An extensive taxonomy and description of a wide variety of computer networks, including the Internet and its associates.

[81] Joyce K. Reynolds, Jonathan B. Postel, Alan R. Katz, Greg G. Finn, and Annette L. DeSchon.
The DARPA Experimental Multimedia Mail System.
IEEE Computer Magazine 18(10):82-89, October, 1985.

A history and overview of an experiment in multimedia mail over the Internet.

[82] Marshall T. Rose.
Comments on ‘‘Comments on ‘Congestion control in TCP/IP internetworks’ ’’ or The Holy Wars begin again.
Computer Communication Review 15(5):2-9, October/November, 1985.

Contradicts the assertion in [41] that the problems noted in [67] are inherent in packet-switched networking.

[83] Marshal T. Rose and Dwight E. Cass.
OSI Transport Services on Top of the TCP.
Computer Networks 12(3):159-173, 1986.

Describes an implementation of OSI protocols layered over TCP, in order to allow experience with OSI protocols before OSI networks are available.

[84] Jerome H. Saltzer, David D. Clark, John L. Romkey, and Wayne C. Gramlich.
The Desktop Compuer as a Network Participant.
IEEE Journal on Selected Areas in Communication SAC-3(3):468-478, May, 1985.

Design of, implementation of, and experiences with the PCIP system providing IP protocols on an IBM PC.

[85] Jerome H. Saltzer, David P. Reed, and David D. Clark.
End-To-End Arguments in System Design.
TOCS 2(4):277-288, November, 1984.

Presents a design principle that helps guide placement of functions among the modules of a distributed computer system.

[86] R. Sandberg, D. Goldberg, S. Kleiman, D. Walsh, and B. Lyons.
Design and Implementation of the Sun Network Filesystem.
In *Proc. Summer 1985 USENIX Conference*, Pages 119-130. Portland, OR, June, 1985.

A description of the widely-used NFS protocol and its most common implementation.

[87] Dheeraj Sanghi, M. C. V. Subramanian, A. Udaya Shankar, Olafur Gudmundsson, Pankaj Jalote.
Instrumenting a TCP Implementation.
TR 2061, Computer Science Department, University of Maryland, July, 1988.

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