
Finding Aid for the Leonard Kleinrock Papers LSC.2337

Finding aid prepared by Sonia Collazo and UCLA Library Special Collections staff, 2013

Processing was supported by UCLA University Archives and Kleinrock Internet History Center.

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Contributing Institution: UCLA Library Special Collections

Title: Leonard Kleinrock papers

Source: United States. Advanced Research Projects Agency

Identifier/Call Number: LSC.2337

Physical Description: 2.4 Linear Feet(6 document boxes)

Date (inclusive): 1957-1980

Abstract: Leonard Kleinrock, UCLA faculty in Computer Science since 1964. He received his BA from CCNY and MA and PhD from the Massachusetts Institute of Technology. Kleinrock ran the University of California, Los Angeles (UCLA) Network Measurement Center (NMC), the first ARPANET node. The Kleinrock Papers include: McGraw-Hill Publishers correspondence; technical notes; Advanced Research Projects Agency progress reports; publications materials; Interface Message processor logs; SPADE administrative notes; Miscellaneous Network Notes; ARPANET Satellite System notes; Packet Radio Temp notes; and Networks Use Technical notes.

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Language of Material: English .

Conditions Governing Access

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Preferred Citation

[Identification of item], Leonard Kleinrock papers (Collection 2337). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.

Provenance/Source of Acquisition

Materials donated by Leonard Kleinrock.

Processing Information

Collections are processed to a variety of levels depending on the work necessary to make them usable, their perceived user interest and research value, availability of staff and resources, and competing priorities. Library Special Collections provides a standard level of preservation and access for all collections and, when time and resources permit, conducts more intensive processing. These materials have been arranged and described according to national and local standards and best practices.

Processed by May Chua in 2012, with additional material processed by Sonia Collazo and Jason Hong in 2013 under the supervision of Charlotte Brown, University Archivist.

UCLA Catalog Record ID

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Biography/History

Leonard Kleinrock was born in New York City on June 13, 1934. He received a Bachelor of Electrical Engineering degree in 1957 from the City College of New York, and a master's degree and a doctorate (Ph.D.) in electrical engineering and computer science from the Massachusetts Institute of Technology (MIT) in 1959 and 1963 respectively. Kleinrock developed a mathematical theory of packet networks, the technology underpinning the Internet, while a graduate student at MIT in the period from 1960-1962. Kleinrock has served as a Professor of Computer Science at the University of California Los Angeles (UCLA) since 1963. The first host-to-host ARPANET connection occurred in the UCLA Network Measurement Center run by Kleinrock (3420 Boelter Hall at UCLA) when his SDS Sigma 7 Host computer became the first node of the Internet in September 1969. From UCLA, Kleinrock directed the transmission of the first message to pass over the Internet on October 29, 1969. Kleinrock served with programmer Charley Kline as Chairman of the Computer Science department at UCLA from 1991-1995 and is a Distinguished Professor of Computer Science at UCLA. During his tenure at UCLA, Kleinrock supervised the research for 48 Ph.D. students and numerous M.S. students who formed a core of advanced networking experts. Kleinrock has published over 250 papers and authored six books on a wide array of subjects, including packet switching networks, packet radio networks, local area networks, broadband networks, gigabit networks, nomadic computing, intelligent software agents, performance evaluation, and peer-to-peer networks. Kleinrock received numerous awards

including the prestigious National Medal of Science in 2008 for his contributions to the mathematical theory of modern data networks and for the functional specification of packet switching. In 2012, Kleinrock was inducted into the Internet Hall of Fame by the Internet Society.

Scope and Content

Leonard Kleinrock's papers include: correspondence for publication of his book, *Communication nets: Stochastic message flow and delay*. (McGraw-Hill, 1964); technical notes from his design work at Digital Equipment Corporation (DEC); and materials from the Network Measurement Center (NMC) which discuss the early development of the Internet in the United States during the 1960s and 1970s. Materials from the NMC consist of notes and papers from the first ARPANET node at UCLA. The papers include Interface Message Processor Logs documenting the first message on the ARPANET and progress reports to ARPA. The notes detail the technical evolution of the ARPANET Satellite System (ASS) and the ALOHA system including Request for Comments (RFC) and a Bolt Beranek and Newman Quarterly Technical Report. There are also Administrative notes from the SPADE Group, responsible for the Sigma 7 system software and programming support for the ARPA project, consisting of Agenda, meeting notes, and bug lists including NUTS notes referring to the TENEX program. Finally there are notes detailing Packet Radio Communication and its application for distribution of data consisting of meeting notes, academic papers, and protocol notes. Arrangement is by note number first and then chronologically providing a technical progression for the history of the ARPANET.

Organization and Arrangement

The collection is arranged into the following series:

1. McGraw-Hill Publishers Correspondence
2. Technical Notes
3. Progress Reports to the Advanced Research Projects Agency
4. Publications
5. Interface Message Processor Logs
6. SPADE Administrative Notes
7. Miscellaneous Network Notes
8. ARPANET System Satellite Notes and Request for Comments
9. Packet Radio Temp Notes
10. Networks Use Technical (NUTS) Notes

Manuals and documents are ordered chronologically within series. Notes are ordered by note number first and then chronologically to reflect the original arrangement which provides a progression for the history of the ARPANET.

Existence and Location of Copies

Selected items were digitized for the Kleinrock Internet History Center (KIHC) Digital Collections:

<http://digital2.library.ucla.edu/internethistory/>.

Subjects and Indexing Terms

ARPANET (Computer network).

Internet -- History -- United States -- Archives.

Packet switching (Data transmission) -- Archives.

Digital Equipment Corporation

Kleinrock, Leonard--Archives.

Postel, Jonathan Bruce

United States. Advanced Research Projects Agency

Series 1: McGraw-Hill Publishers Correspondence 1963-1965

Scope and Contents note

Materials relating to the publication of Kleinrock's Massachusetts Institute of Technology (MIT) Ph.D. Thesis *Communication nets: Stochastic message flow and delay*. (McGraw-Hill, 1964) and includes: letters, memorandum, and proofs.

box 1, folder 1-2

box 1, folder 3

McGraw-Hill Publishers - General Correspondence 1963-1964

McGraw-Hill Publishers - General Correspondence 1964-1965

Series 2: Technical Notes 1957-1963

Scope and Contents note

Technical notes from Kleinrock's research. Includes notes on the Variable Delay Unit one of the first Digital Equipment Corporation (DEC) products, the Magnetic Films Seminar at MIT, and the TX-2 network simulation program. Includes notes, papers, schematics and simulation data in graphs and computer printouts.

box 1, folder 4
box 1, folder 5
box 1, folder 6
box 1, folder 7
box 1, folder 8
box 1, folder 9-11
box 2, folder 1-3
box 2, folder 4
box 2, folder 5

Variable delay unit original notes 1957

The Magnetic Films Seminar at MIT 1961

TX-2 Simulation Specifications 1961

TX-2 Miscellaneous program and Simulation Notes 1962

TX-2 Numerical Data from Simulation 1962

TX-2 Network Simulation Program Notes Part A 1961-1962

TX-2 Network Simulation Program Notes Part B 1962

TX-2 Network Simulation Program Notes part C 1961-1963

Unspecified material - Computer Printouts 1963

Series 3: Progress Reports to the Advanced Research Projects Agency (ARPA) 1963-1973

Scope and Contents note

Progress reports to the Advanced Research Projects Agency during the period of the early development of the ARPANET. Includes technical reports, contracts, and correspondence.

box 2, folder 6
box 2, folder 7
box 2, folder 8

"Progress Report to the Advanced Research Projects Agency" (1 of 3) 1963-1973

"Progress Report to the Advanced Research Projects Agency" (2 of 3) 1963-1973

"Progress Report to the Advanced Research Projects Agency" (3 of 3) 1963-1973

Series 4: Publications 1963-1975

box 3, folder 1
box 3, folder 2-4
box 3, folder 5
box 3, folder 6
box 3, folder 7

Publication Outline - "Communication Nets stochastic message and delay" circa 1963

Publication Draft - "Communication Nets stochastic message and delay" 1964

Publication Proof - "Communication Nets stochastic message and delay" 1964

Publication Galley - "Communication Nets stochastic message and delay" 1964

American Federation of Information Processing Societies (AFIPS) Conference Proceedings 1974

box 3, folder 8

List of "Material in archive" circa 1975

Series 5: Interface Message Processor Logs 1969-1979

Scope and Contents note

Handwritten logs from the UCLA Network Measurement Center showing, the first ARPANET node, including the first host-to-host connection (October 1969).

box 4, folder 1
box 4, folder 2
box 4, folder 3
box 4, folder 4

Interface Message Processor Log 1969-1970

Interface Message Processor Log 1970

Interface Message Processor Log 1970-1971

Interface Message Processor Log 1974-1976; 1979

Language of Material: English.

Series 6: SPADE Administrative Notes, System Manuals, and User Guides 1969-1973

Scope and Contents note

Administrative notes, system manuals and user guides from the UCLA SPADE Group responsible for SDS Sigma 7 system software, Sigma Experimental System (SEX), and programming support for the ARPA project. The SDS Sigma 7 system was the first system to connect to the ARPANET at UCLA, the first ARPANET node.

Subseries 6.1: SPADE Administrative Notes 1969-1972

Scope and Contents note

SPADE administrative notes including: Fortran programming language implementation, early implementation of the Telnet network protocol, network measurement, Network Control Program (NCP) development, and the Sigma Experimental System (SEX) operating system for the SDS Sigma 7.

box 4, folder 5

Index of SPADE Notes 10 Nov 1969-7 Jun 1971

box 4, folder 6

SPADE Administrative Notes, 1-45 10 Oct 1969-11 Aug 1970

Scope and Contents

Notes of interest: SPADE Admin Note 1: "the SPADE Group" (discusses group creation)
SPADE Admin Note 20: SPADE Meeting note (name change GORDO to SEX, Sigma EXchange System)
Missing notes: 6, 36

box 4, folder 7

SPADE Administrative Notes, 46-80 18 August 1970 to 10 February 1971

Language of Material: English.

Scope and Content

Notes of interest: SPADE Admin Note 53: John Postel diagram on SEX implementation
SPADE Admin Note 63: NW Measurements meeting (9 IMPS on network) SPADE Admin Note 69: SPADE Meeting Note (early note on Telnet and mailboxes) SPADE Admin Note 71: Progress report (SPADE group divides: SEX, Network measurement, and coordination of network development) SPADE Admin Note 76: The Plan (diagram of workflow for 3 month plan for network, systems, graphics, documents)

box 4, folder 8

SPADE Administrative Notes 81-110 12 February 1971 to 28 May 1971

Language of Material: English.

Scope and Content

Note of interest:
SPADE Admin Note 88: SPADE Meeting (discusses making net history with live user of BBN TENEX via telnet); SPADE Admin Note 94: Crashes and what to do about them
Missing note: 105

box 4, folder 9

SPADE Administrative Notes 111-140 4 June 1971- 20 August 1971

Scope and Contents note

Notes of interest:

SPADE Admin Note 116: (comments such as "catch up on missed meals, sleep and showers, gives slice of life); SPADE Admin Note 118: (notes on design process for SEX console)

SPADE administrative notes 120, 134, and 139 are missing.

box 4, folder 10

SPADE Administrative Notes, 141-170 26 August 1971 - 18 November 1971

Scope and Content

Notes of interest:

SPADE Admin Note 141: Bug List (example of computer printout for bug reports)
SPADE Admin Note 160: SPADE Meeting (L. Roberts report "caused a stir")

box 4, folder 11

SPADE Administrative Notes, 171-199 19 November 1971 - 10 March 1972

Scope and Content

Notes of interest:

SPADE Admin Note 176: SPADE Meeting (diagram of 3 months system tasks/development)

SPADE Admin Note 178: SPADE Meeting (diagram for USER host)

SPADE Admin Note 180: SPADE Meeting (diagram Sigma 7 software)

SPADE Admin Note 197: SPADE Meeting (diagram CCN model)

SPADE administrative note 188 is missing.

box 4, folder 12

SPADE Notes to Secretaries 14, Printing Documents at UCLA-CCN 3 April 1973

Subseries 6.2: System Manuals and User Guides 1973

Scope and Contents note

System manuals and user guides for the Network Information Center (NIC) and Sigma Experimental System (SEX).

box 5, folder 1

Network Information Center User Guide 9 Jan 1973

box 5, folder 2

SEX Beginner's Guide 20 Jan 1973

box 5, folder 3

Document #8 SEX User's Manual 27 Jan 1973

box 5, folder 4

Brief Description of Some Arpanet Resources and Their Uses 12 Dec 1973

Series 7: Miscellaneous Network Notes 1969-1978

box 5, folder 5

Misc NW Notes, 1-16 24 November 1969-2 February 1971

Scope and Contents note

Notes of interest are:

Misc NW Note 10 UCLA Computer Science Site profile

Misc NW Note 12 Bibliography of Literature on Computer Networking

Missing Misc NW notes 3-8, 11, 15.

box 5, folder 6

Misc NW Notes, 17-39 26 March 1971 - 18 March 1976

Scope and Content

Notes of interest are:

Misc NW Note 17 Guide to Network Working Group/Request for Comments

Misc NW Note 18 ARPA Net

Missing Misc NW Notes 25-31, 34.

box 5, folder 7

Letter: BBN Connected to Arpanet Site #5 30 March 1970

box 5, folder 8

Protocol Spec NIC #7101 Official Initial Connection Protocol 11 Jun 1971

box 5, folder 9

Protocol Spec NIC #7103 Official Telnet Logger-Initial Connection Protocol Document #3 15 Jun 1971

box 5, folder 10

IFIP/INWG Meeting, NPL 12 May 1978

box 5, folder 11

IFIP/INWG Results of Questionnaire on Distributed Processing Systems 22 May 1978

Series 8: ARPANET Satellite System (ASS) Notes and Request for Comments 1972-1976

Scope and Contents note

ARPANET Satellite System (ASS) Notes, Request for Comments, and a related BBN technical Report from the UCLA Network Measurement Center. The ARPANET Satellite System was a data communications network based on packet switching technology using ALOHA system methods such as asynchronous random access.

Subseries 8.1: ARPANET Satellite System (ASS) Notes 1972-1973

box 5, folder 12
box 5, folder 13
box 5, folder 14
box 5, folder 15
box 5, folder 16

List of ARPANET Satellite System Notes 6 Apr 1973
ASS Note Index 14 Aug, 5 Dec 1973
Peak Rate for Satellite Stations 1972
ARPANET Satellite System Misc. Inserts [1972]
ARPANET Satellite System (ASS) Notes, 2-15 20 March -11 September 1972

Scope and Contents note

Papers of interest:

ASS Note 8: "Aloha packet System with and without slots and capture" by Lawrence G. Roberts

ASS Note 11: "A brief Simulation of the Dynamics of and Aloha system with slots" by Randy Rettberg

ASS Note 12: "Analytic Results for the ARPANET Satellite. System Model Including the Effects of the Retransmission Delay Distribution" by Leonard Kleinrock and Simon Lam

Missing ASS Note 1

box 5, folder 17

ARPANET Satellite System (ASS) Notes, 16-25 18 October 1972- 20 November 1972

Scope and Content

Papers of interest:

ASS Note 17: "Approximations in the Infinite Population Model of the ARPANET Satellite System." by Kleinrock and Lam

ASS Note 21: "A Comparison of BBN ALOHA and Idealized Slotted Aloha"

Missing ASS notes 40 and 49.

box 5, folder 18

ARPANET Satellite System (ASS) Notes, 26-32 15 November 1972 - 27 December 1972

Scope and Content

Papers of interest:

ASS Note 27: "Analytic Results with the Addition of one Large User." by Kleinrock and Lam

box 5, folder 19
box 6, folder 1

ARPANET Satellite System (ASS) Notes, 33-39 26 December 1972 - July 1973
ARPANET Satellite System (ASS) Notes, 41-51 29 April 1973 - 7 September 1973

Scope and Content

Missing ASS notes 40 and 49.

box 6, folder 2
box 6, folder 3-5

Note to ASS Note Recipients 20 September 1973
ARPANET Satellite System (ASS) Notes, 52-53, 57 8 November 1973 - 1973

Scope and Content

Missing ASS Notes 54, 55, 56, 58, and 59.

box 6, folder 6

Corrections to ASS Note 59 1973

Subseries 8.2: Request for Comments (RFC) and BBN Technical Report 1972-1976

Scope and Contents note

Request for Comments detailing the use of space transmission links in the ARPANET including Echo and Discard processes, and a proposed standard for socket numbers for network protocols. The BBN report describes their work on the Packet Radio Satellite project.

box 6, folder 7
box 6, folder 8

RFC: 346 - 349 30 May 1972
BBN PSP Quarterly Technical Report for May, June, July 1976 18 Sep 1976

Series 9: Packet Radio Temp Notes 1972-1980

Scope and Contents note

Packet Radio Temp Notes detailing packet radio communication and its use for distribution of data, and Protocol notes describing flow control principles for packet switched network protocols.

Subseries 9.1: Packet Radio Temp Notes 1972-1974

box 6, folder 9
box 6, folder 10
box 6, folder 11

Packet Radio Temporary Note Index 6 Mar 1974
Report: First Packet Radio Working Group Meeting circa 1972
Packet Radio Temp Notes, 1-10 14 December 1972-December 1972

Scope and Contents note

Papers of interest:

PRTN 1: "Packet Radio Meeting of December 12-13, 1972" (defines terms, IDs and involved institutions)

The following Packet Radio Temp notes are missing: 8, 9.

box 6, folder 12

Packet Radio Temp Notes, 11-20 15 January 1973 - 16 February 1973

Scope and Content

Papers of interest:

PRTN 11: "Routing in Packet Radio Systems. Controlled Flooding Using Handover Numbers" by Kleinrock and Tobagi

The following Packet Radio Temp notes are missing: 18, 19, 21.

box 6, folder 13

Packet Radio Temp Notes, 22-30 5-28 February 1973

Scope and Content

Papers of interest:

PRTN 24: "Throughput in Carrier-Sense (AutoSlot) Packet Radio Systems" by Kleinrock and Tobagi

PRTN 29: Facsimile Data Format by L. Schaefer

box 6, folder 14

Extended Directory of Network Groups 18 May 1973

Subseries 9.2: Protocol Notes 1974-1980

box 6, folder 15
box 6, folder 16
box 6, folder 17

Protocol Note #8 Flow Control 28 Oct 1974
INWG Protocol Note #12 An Integrated Approach to Network Protocols Nov 1974
Protocol Note #17 Packet Loss and Its Recovery in a Packet Switched Network Feb 1975

box 6, folder 18

INWG Protocol Note #28 Some Constraints and Tradeoffs in the Design of Network Communications

box 6, folder 19

INWG Protocol Note #21 A Proposal for Fragmenting Packets in Internetworking Apr 1975

box 6, folder 20

PRTN 22 Activity Signalling and Improved HOP Acknowledgements Jan 1980

Series 10: Networks Use Technical (NUTS) Notes 1973-1974

Scope and Contents note

Networks Use Technical (NUTS) notes including: a new Mail Subsystem, the NLS system, accounts for the UCLA Network Measurement Center (NMC), the SEXDOC program, and BBN Tenex programs such as CCNJOB, an interactive Tenex program for document printing and reading SDS Sigma 7 SEX tapes. The NUTS notes refer to accounts, systems, program and the BBN TENEX project that provided programs used by the SPADE group.

box 6, folder 21

NUTS Notes 1-4 5-6 April 1973

box 6, folder 22
box 6, folder 23

NUTS Notes 14 - 16 5 April - 2 May 1974
NUTS Notes 21-22 4-5 Apr 1974