Leonard Kleinrock papers

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**Title:** Leonard Kleinrock papers  
**Collection number:** 2773  
**Contributing Institution:** UCLA Library Special Collections  
**Language of Material:** English  
**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.  
**Physical Location:** Stored off-site at SRLF. All requests to access special collections materials must be made in advance through our electronic paging system using the request button located on this page.  
**Creator:** Kleinrock, Leonard  
**Conditions Governing Access**  
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**Physical Characteristics and Technical Requirements**  
Selected items were digitized for the Kleinrock Internet History Center (KIHC) Digital Collections:  
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**Preferred Citation**  
[Identification of item], Leonard Kleinrock Papers (Collection 2773). UCLA Library Special Collections, Charles E. Young Research Library, University of California, Los Angeles.  
**UCLA Catalog Record ID**  
UCLA Catalog Record ID: 8155003  
**Provenance/Source of Acquisition**  
Materials donated by Leonard Kleinrock.  
**Processing Information**  
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.  
**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.

Subjects and Indexing Terms
Digital Equipment Corporation.
Kleinrock, Leonard--Archives.
Postel, Jonathan Bruce, 1943-1998
ARPANET (Computer network)--Archives.
Internet--History--United States--Archives.
Packet switching (Data transmission)--Archives.

Scope and Content Note

Box 1, Folder 1-2
Box 1, Folder 3

Scope and Content 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.

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Box 1, Folder 4  Variable delay unit original notes. 1957.
Box 1, Folder 5  The Magnetic Films Seminar at MIT. 1961.
Box 1, Folder 6  TX-2 Simulation Specifications. 1961.
Box 1, Folder 7  TX-2 Miscellaneous program and Simulation Notes. 1962.
Box 1, Folder 8  TX-2 Numerical Data from Simulation. 1962.
Box 1, Folder 9-11  TX-2 Network Simulation Program Notes Part A. 1961-1962.
Box 2, Folder 1-3  TX-2 Network Simulation Program Notes Part B. 1962.
Box 2, Folder 5  Unspecified material - Computer Printouts. 1963.


Scope and Content 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 3, Folder 2-4  Publication Draft - "Communication Nets stochastic message and delay". 1964.
Box 3, Folder 5  Publication Proof - "Communication Nets stochastic message and delay". 1964.
Box 3, Folder 6  Publication Galley - "Communication Nets stochastic message and delay". 1964.
Box 3, Folder 8  List of "Material in archive". circa 1975.


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


Language of Material: English


Scope and Content 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.


Scope and Content 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.
<table>
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<td>Notes of interest:</td>
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<td>SPADE Admin Note 1: &quot;the SPADE Group&quot; (discusses group creation)</td>
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<td>SPADE Admin Note 20: SPADE Meeting note (name change GORDO to SEX, Sigma EXchange System)</td>
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<td>Missing notes: 6, 36</td>
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<th>Box 4, Folder 7</th>
<th>SPADE Administrative Notes, 46-80. 18 August 1970 to 10 February 1971.</th>
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<tr>
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<td>SPADE Admin Note 53: John Postel diagram on SEX implementation</td>
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<td>SPADE Admin Note 63: NW Measurements meeting (9 IMPS on network)</td>
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<tr>
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<td>SPADE Admin Note 69: SPADE Meeting Note (early note on Telnet and mailboxes)</td>
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<tr>
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<td>SPADE Admin Note 71: Progress report (SPADE group divides: SEX, Network measurement, and coordination of network development)</td>
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<td>SPADE Admin Note 76: The Plan (diagram of workflow for 3 month plan for network, systems, graphics, documents)</td>
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<th>Box 4, Folder 8</th>
<th>SPADE Administrative Notes 81-110. 12 February 1971 to 28 May 1971.</th>
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<th>Box 4, Folder 9</th>
<th>SPADE Administrative Notes 111-140. 4 June 1971- 20 August 1971.</th>
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<td>SPADE administrative notes 120, 134, and 139 are missing.</td>
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<td>Notes of interest:</td>
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<td></td>
<td>SPADE Admin Note 176: SPADE Meeting (diagram of 3 months system tasks/development)</td>
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<td>SPADE Admin Note 178: SPADE Meeting (diagram for USER host)</td>
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<tr>
<td></td>
<td>SPADE Admin Note 180: SPADE Meeting (diagram Sigma 7 software)</td>
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<td>SPADE Admin Note 197: SPADE Meeting (diagram CCN model)</td>
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<tr>
<th>Box 4, Folder 12</th>
<th>SPADE Notes to Secretaries 14, Printing Documents at UCLA-CCN. 3 April 1973.</th>
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Scope and Content Note
System manuals and user guides for the Network Information Center (NIC) and Sigma Experimental System (SEX).

Box 5, Folder 1
Box 5, Folder 2
Box 5, Folder 3
Box 5, Folder 4
Brief Description of Some Arpanet Resources and Their Uses. 12 Dec 1973.


Box 5, Folders 5
Scope and Content 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
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
Box 5, Folder 9
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.

Scope and Content 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.


Box 5, Folder 12
Box 5, Folder 13
Box 5, Folder 14
Peak Rate for Satellite Stations. 1972.
Box 5, Folder 15
ARPANET Satellite System Misc. Inserts. [1972].
Box 5, Folders 16
Scope and Content Note
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, Folders 17
Scope and Content
ASS Note 21: "A Comparison of BBN ALOHA and Idealized Slotted Aloha"
Missing ASS notes 40 and 49.

Box 5, Folder 18
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
Scope and Content
Missing ASS notes 40 and 49.

Box 6, Folder 2
Note to ASS Note Recipients. 20 September 1973.

Box 6, Folders 3-5
Scope and Content
Missing ASS Notes 54, 55, 56, 58, and 59.

Box 6, Folder 6

Scope and Content 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

Scope and Content Note


Box 6, Folder 9
Box 6, Folder 10
Box 6, Folders 11
Scope and Content 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.

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 by Kleinrock and Tobagi
PRTN 29: Facsimile Data Format by L. Schaefer

Box 6, Folder 14  Extended Directory of Network Groups. 18 May 1973.


Box 6, Folder 15  Protocol Note #8 Flow Control. 28 Oct 1974.
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.

Scope and Content 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  NUTS Notes 14 - 16. 5 April - 2 May 1974.
Box 6, Folder 23  NUTS Notes 21-22. 4-5 Apr 1974.