

The paper reaches its conclusion by pointing out what it alleges to be similarities in voice calls and Internet transactions. However, the analogies it draws are so strained as to render them meaningless.

The paper starts with a description and nature of a voice call; I have no argument with that description. Where things begin to go awry is at the end of paragraph 7. There, Jackson claims that the end-to-end communication characteristic of a voice call does not end just because the voice signal undergoes analog-to-digital and digital-to-analog conversions. I agree with him – in fact, I will go further and agree that in a dial-up connection to the Internet, there is a conversion in the form of data being transmitted from analog to digital. But this doesn't begin to scratch the surface of the profound differences between Internet communications and long distance calls I have described.

Next, in paragraphs 9-10, Jackson describes the process of making a credit card call. In paragraph 10, he claims the caller “does not generally know what occurs behind the scenes.” That may be – the internal workings of a computer are a mystery to most people. But here is what the caller does know, by Jackson's own account: he/she has to dial special digits, listen to and respond to prompts, dial the intended destination number, and dial calling card and pin number. The user is aware of and involved in every step of the calling card process. By contrast, the Internet situation is quite different – processes like the name translation process involve application-to-application dialogs in which the user has no role and is unaware that they are even happening. In fact, my experience in talking to the average lay user of the Internet is that most users are not even aware of the distinction between an Internet name and an Internet address, nor, therefore, do they realize a conversion process must take place.

In paragraph 11, Jackson asserts “When a dial-up customer connects to the Internet, these connections typically are routed around the country (and often around the world) and finally terminate at a distant location on a web server.” My question is: what connections are we talking about – there are no “connections” in the Internet. The Internet is connectionless. The closest one comes to a “connection” is the TCP session that may be established by the communicating computers, or the “query-response” dialog that is taking place between applications. Neither of these involve the network – the routers in the network have no cognizance that there is a TCP or application dialog taking place. They know only that they are receiving individual datagrams, each containing a destination address towards which the routers are supposed to route the datagram. This is very different than the voice network, where switches are aware of and maintain actual network connections. Furthermore, neither TCP nor the application dialog involve the user – all of this is going on in the background, and requires no actions by the user.

I have no argument with the paragraph 11-12 description of how a given application transaction takes place. But, the conclusion reached in paragraph 13, that the dialup connection “is part of a single integrated or end-to-end Internet communication or call,” is flawed. Again, it totally ignores the facts that 1) there is no Internet “call” because there is no network connection across the network; and 2) several processes – “calls,” in Jackson’s vernacular – may and often do take place in succession over a single dialup connection to the ISP. Thus over one circuit switched connection between a user and the ISP, there may be multiple sessions to different domain name servers, and multiple sessions involving, say, different email recipients or different computers identified in WWW pages containing links to other pages. Jackson himself acknowledges this possibility in paragraph 14 when he says “Of course, as in the calling card example above, a customer may communicate with a

number of different web sites during any given session.” But the situation is very different than the calling card example. Credit card verification takes place once, at the beginning of a call. The user is fully involved in the credit card verification process. By contrast, in the case of the Internet, the user takes no action to initiate multiple sessions – he or she does not redial, does not have to set up a conference session, etc. What is the voice equivalent of such a process-intensive dialog with multiple parties at multiple locations during a single connection to the Internet? There is none.

The description of end-end transparency, security, and traceroute in paragraphs 15-21 are intended to support Jackson’s notion of the end-to-end communications that take place in the Internet. I agree that there is such end-end transparency on any one session between two hosts. But the description conveniently fails to explain how multiple transactions are taking place over a single dial-up connection to the ISP. Again, there is no equivalency between long distance calls involving user-to-user connections and the Internet dial-up call that carries information pertaining to multiple sessions involving multiple destinations.

## **VI. Conclusion**

A dial-up call to an ISP represents local telecommunications traffic. This is true because there is no connection across the Internet corresponding to the dial-up call. There cannot be such a connection, because, fundamentally, the Internet is connectionless. The lack of correspondence is further demonstrated by the fact that at various times during a single dial-up call there may be 1) no flow of information across the Internet, even though information is flowing over the dial-up connection; 2) no flow of information over the dial-up connection even though there is information flowing across the Internet related to the application the user invoked; 3) flows between multiple points in the Internet, either

simultaneously or sequentially; and 4) flows that take place at different times for different phases of an application.

The right way to characterize the situation is that a dial-up call to an ISP triggers communications across the Internet that are a fundamentally different kind of enhanced process-to-process communications. The best analogy is with a telecommuter or other remotely-located employee dialing into his/her company's computer network and triggering various processes within that network. These processes do not represent a continuation of the dial-up call, and in fact cannot reasonably be described as "calls" at all. And, even if the corporate network were spread across disparate geographic locations, one would not certainly not attempt to describe the flow of information across the dial-up connection and the computer network as a long distance call.

The foregoing statements are true and correct to the best of my knowledge, information, and belief.

/s/Robert A. Mercer  
Robert A. Mercer

August 4, 2000  
Date

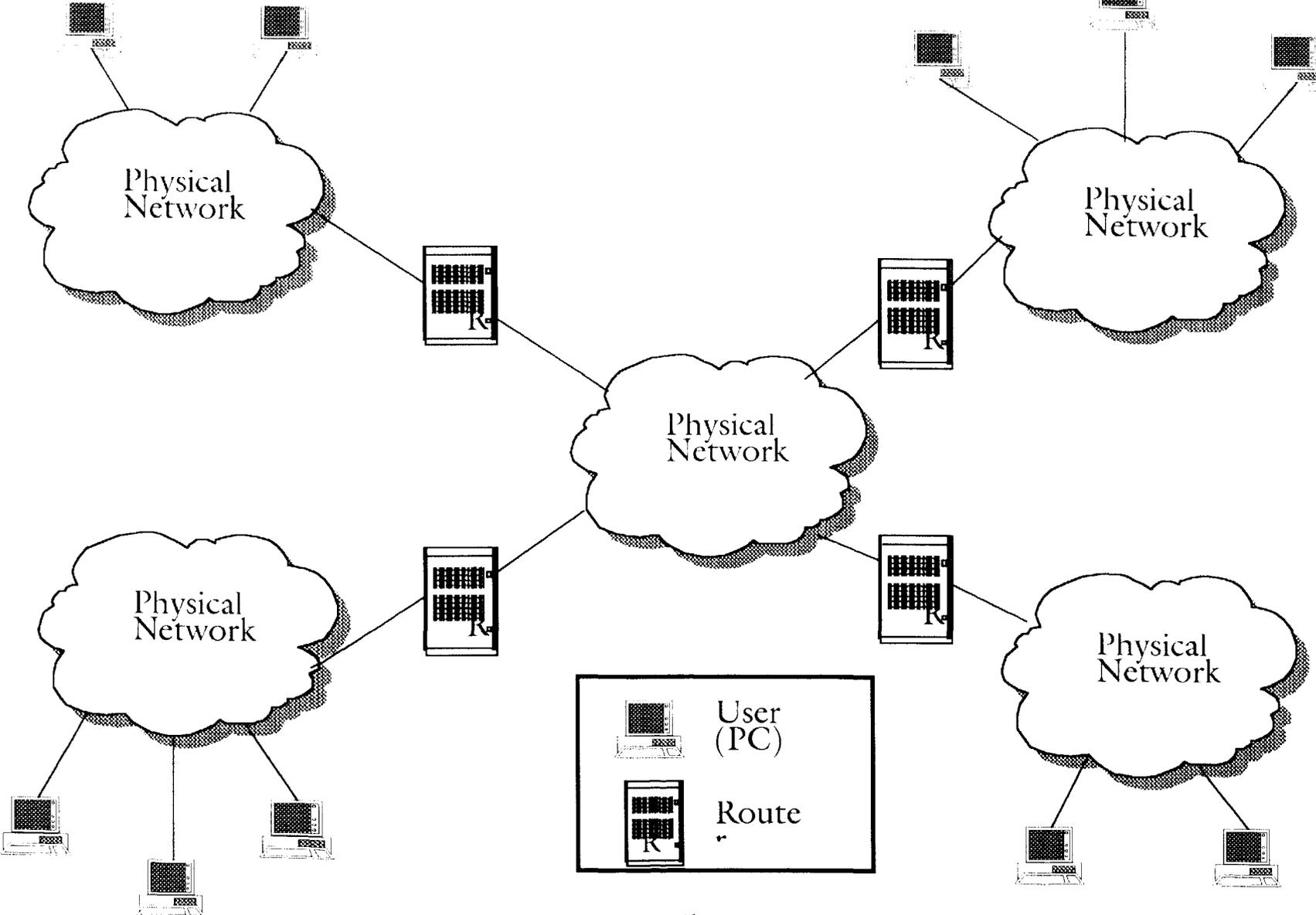


Figure 1a: The Generic Internet

Backbone  
Networks

Regional  
ISP Networks

Local ISP  
Networks

Premises  
"Network"

End-User

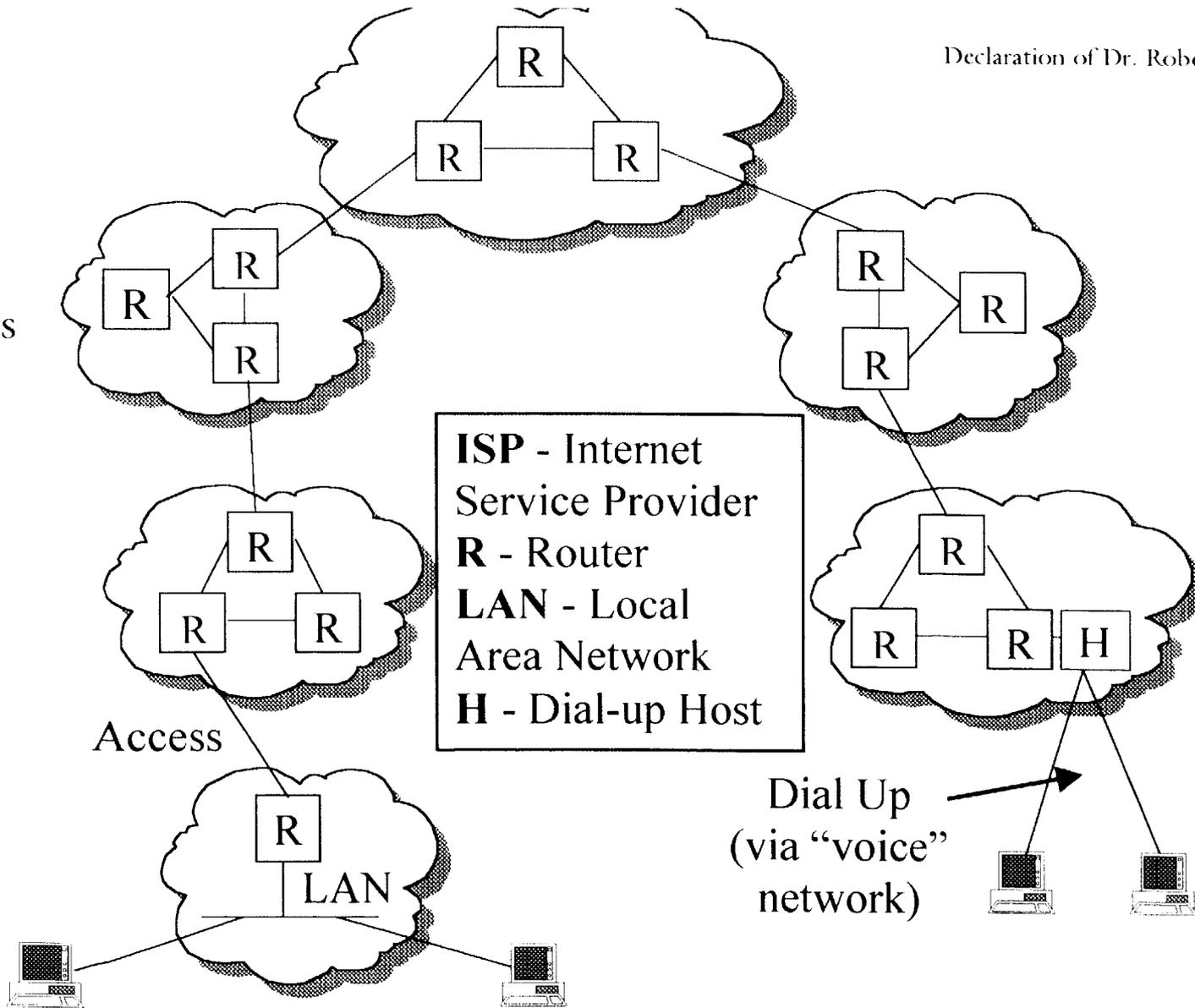


Figure 1b: The U.S. Internet

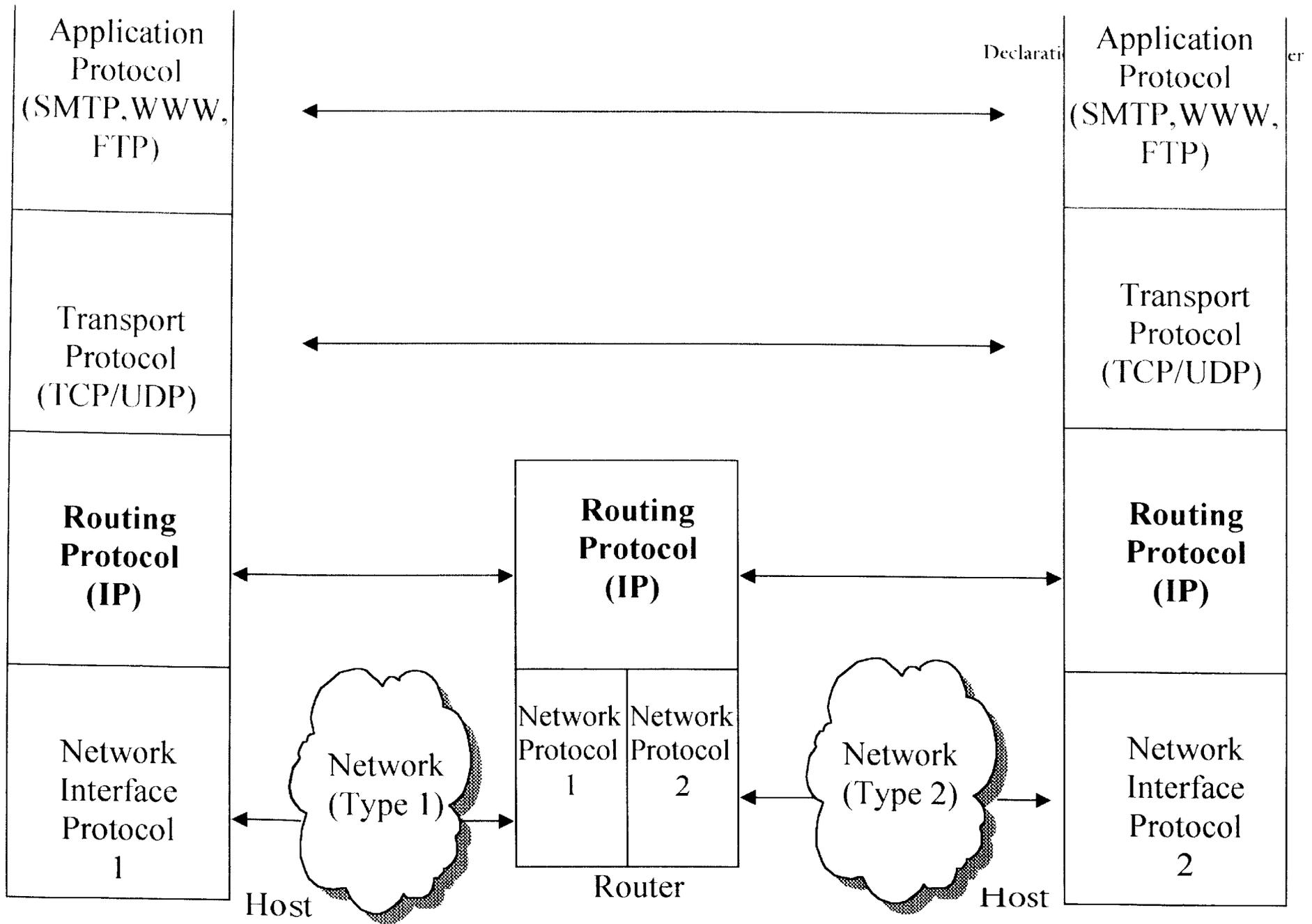


Figure 2: Internet Protocols

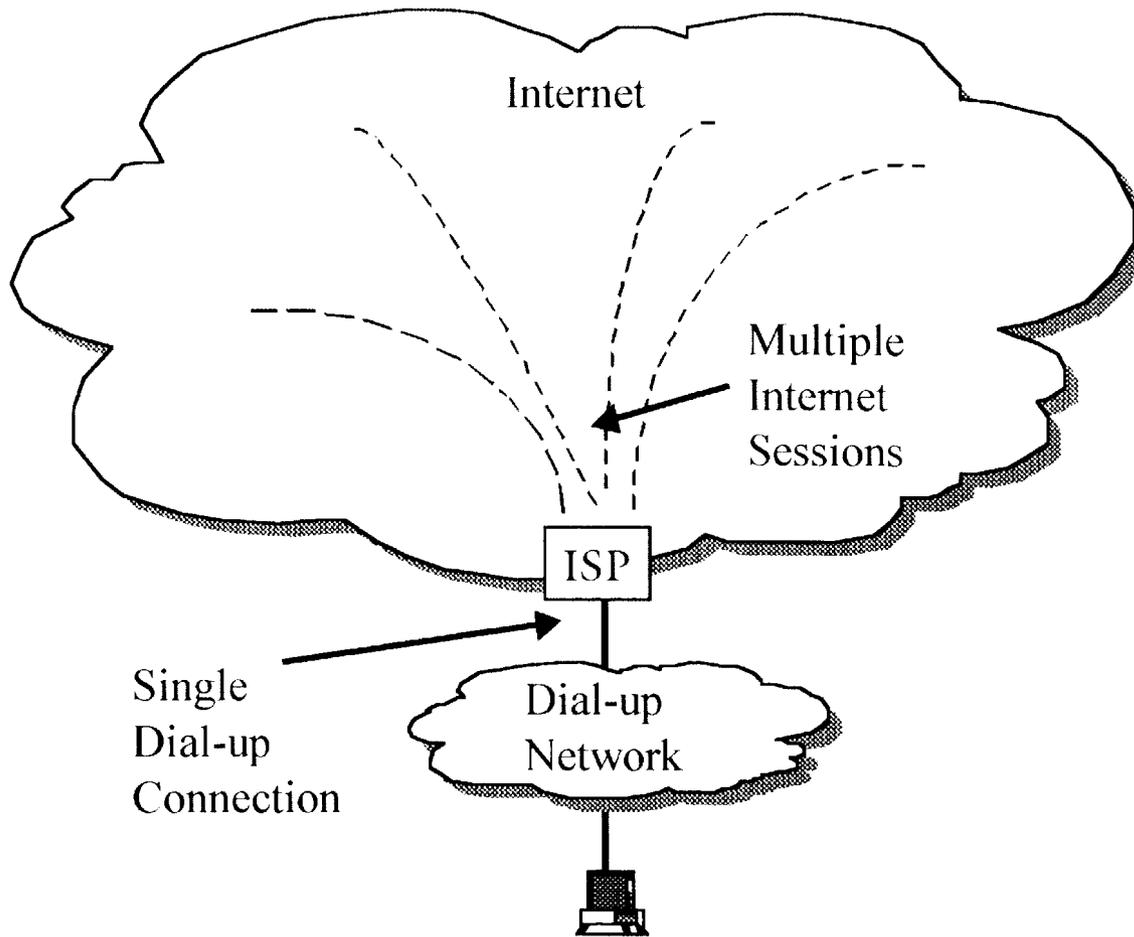


Figure 3: Internet Sessions over Dial-Up Connection

**Dr. Robert A. Mercer, PhD.**

**Experience**

Principal, BroadView Telecommunications, LLC, March, 2000-Present

Provides strategic planning and education related to public and private telecommunications infrastructures, considering technologies, network architectures, providers, and services supported. The work is currently focused on local exchange and long-haul competition, broadband integrated networks, and private enterprise networking. Specific examples include the analysis of competitive alternatives for the provision of local exchange services, assessing the state of long distance facilities and services competition, and advising a national association on alternative methods of obtaining and managing its telecommunications services.

Conducts telecommunications policy analyses, with particular current emphasis on the interconnection, unbundling, resale, and universal service aspects of the 1996 Telecommunications Act. This focuses on evaluating the cost of local exchange service provided by incumbent telephone companies and other competitive entities, and includes extensive involvement as an expert witness in federal and state regulatory proceedings.

Serves as an adjunct faculty member in the Interdisciplinary Telecommunications Program (ITP) at the University of Colorado, where he has taught a course in advanced data communications and computer networking. Directs and participates on Master's thesis committees in the ITP, and also participates in effort to define and coordinate the program's curriculum, particularly as it pertains to data communications. Has previously developed and taught courses on telecommunications infrastructure directions, multi-protocol networking, TCP/IP, Asynchronous Transfer Mode (ATM), Open Systems Interconnection (OSI), network management, and telecommunications standards, and has presented numerous public seminars and talks on a variety of telecommunications topics.

President, and formerly Senior Vice President, Hatfield Associates, Inc., and HAI Consulting, Inc., 1987 – March, 2000.

Provided strategic planning, analysis, and education related to the telecommunications infrastructure, with a particular emphasis in the late 1990's on federal and state regulatory proceedings dealing with implementation of the 1996 Telecommunications Act. Other work included extensive involvement in FCC and state proceedings on Open Network Architecture (ONA) and Video Dial Tone (VDT), and testimony before state regulatory bodies on the conditions necessary for local exchange competition to flourish, and analyses of telecommunications opportunities available to electric utilities. Was co-author of the well-known "Hatfield Report" and "Hatfield II Report" on the ONA concept, and of a report titled "The Enduring Local Bottleneck," which deals with the ability of alternative providers to enter the local exchange telecommunications business.

Department Head of Datakit Systems Engineering, AT&T Bell Laboratories, 1986-1987

Directed systems engineering of the Datakit product, a virtual circuit switching data communications product of AT&T Technologies. Participated extensively in AT&T planning of its data communications architecture, and the products and services resulting from that architecture.

Senior Executive, BDM Corporation, 1985-1986

Planned data communications networks for various defense agencies. Served as a consultant to several clients on data protocol issues. Developed market projections for secure LANs.

Assistant Vice President of Network Compatibility Planning, Bell Communications Research (Bellcore), 1983-1985

Directed Bellcore support of the Bell Operating Companies (BOCs) in meeting the technical Equal Access requirements of the Modified Final Judgement. Conducted technical fora with the Inter-exchange Carriers and other carriers on behalf of the BOCs. Managed the North American Numbering Plan. Directed Bellcore's involvement in standards-making efforts, and played a key role in the formation of a new U. S. standards committee, Committee T1. Managed the "technical regulatory" work at Bellcore, which analyzed technical aspects of various FCC proceedings, including the ISDN Inquiry, the consideration of how the Computer II rules applied to the divested BOCs, and Computer III. With respect to the latter, was heavily involved in the work on the Comparably Efficient Interconnection concept, which later led to the Open Network Architecture (ONA) concept.

Director of Network Architecture Planning, Bell Laboratories, 1981-1983

Managed early Bell System planning for the Integrated Services Digital Network (ISDN). Provided project management to two key data network planning and implementation activities. Managed Bell Laboratories involvement in several U. S. and international standardization activities. Participated in planning for the Bell Laboratories reorganization in preparation for the AT&T Divestiture.

Division Manager of Network Services Standards, AT&T, 1979-1981

Managed the effort to describe the interface and performance characteristics of the Bell System network, particularly as necessary to meet the terms of the FCC Registration Program. Directed several components of the Bell Systems participation in international telecommunications standards committee CCITT.

Supervisor and Member of Technical Staff, Bell Laboratories, 1973-1979

Analyses of network performance issues and customer perceptions of performance, highlighted by direction of a pioneering study of customer retrial and abandonment

behavior during long-distance telephone calls. Planning for operational processes and operations support systems associated with new Bell System services.

### **Education**

Ph.D., Physics (1969), Johns Hopkins University.

Doctoral Dissertation Title:

$K^+ \pi^-$  Scattering and Related Effects in the Reaction  $K^+ p \rightarrow K^+ \pi^- p$  at 5.43 BeV/c (1969).

B.S., Physics (1964), Carnegie Institute of Technology (now Carnegie-Mellon University).

### **Other Activities and Awards**

Former member of the Board of Directors, American National Standards Institute. Member of the Institute of Electrical and Electronic Engineers (IEEE) and Sigma Xi, the scientific research society.

### **Graduate Courses Taught**

ATM Overview	ATM Technology
Broadband Applications Essentials	Broadband Wide Area Networks
Computer Communications Essentials	Computer Networks
Advanced Data Communications	Data Communications Essentials
Internetworking and TCP/IP Overview	Local Area Network Overview
Multi-Protocol Networking	Networking Trends and Directions
Network Management	T1/T3 Networking Principles
TCP/IP Architecture	Telecommunications Essentials
Telecommunications Industry Essentials	Telecommunications Standards
Voice Applications Essentials	

### **Publications and Talks**

Written Testimony filed by AT&T with the New Jersey Board of Public Utilities dealing with the use of HM 5.2a to estimate the cost of unbundled network elements provided by Bell Atlantic – New Jersey, Newark, New Jersey, July, 2000.

Testimony on network technology issues in a Colorado Public Utility Commission arbitration proceeding on the interconnection of the local exchange networks of US West and ICG Telecom Group, Inc., Denver, Colorado, June, 2000. Proceeded by written rebuttal testimony.

Testimony in an Alaska Public Utility Commission arbitration proceeding dealing with the use of the FCC Synthesis Cost Proxy Model to estimate the cost of unbundled network elements provided by Alaska Communications System (ACS) to GCI Communications

Corporation, Anchorage, Alaska, May, 2000. Preceded by an affidavit filed with the Alaska Public Utility Commission dealing with the reasons why the HAI Model is the appropriate methodology for providing unbundled network elements than is the cost model submitted by ACS.

Written direct testimony filed by AT&T and MCI WorldCom with the New York Public Service Commission dealing with the use of HM 5.2-NY to estimate the cost of unbundled network elements provided by Bell Atlantic - New York, Albany, New York, February, 2000.

Testimony before the Oregon Public Utility Commission dealing with the use of the HAI Model for estimating the cost of universal service, Docket UM 731 Phase IV, Salem, Oregon, October, 1999. Preceded by written direct testimony and rebuttal testimony.

Declaration concerning directions changes in telecommunications technology and networks, co-authored with A. Daniel Kelley, filed by MCI WorldCom and Sprint Corporation with the Federal Communications Commission in connection with the proposed merger of the two companies, Washington, DC, November, 1999.

Declaration concerning the potential for technical discrimination by Bell Atlantic filed by MCI WorldCom with the Federal Communications Commission in connection with Bell Atlantic's application for authorization to provide in-region interLATA services under Section 271 of the 1996 Telecommunications Act, CC Docket No. 99-295, Washington, DC, October, 1999.

"Access Technologies," presentation to the ICA Network Technology Institute, Boulder, Colorado, August, 1999.

"Where Telecommunications Technology and the Industry are Heading," presentation to the Law Seminars International Conference on Local Telecommunications Infrastructure Options, Dallas, Texas, June, 1999.

Written direct testimony and rebuttal testimony filed with the State Corporation Commission of the State of Kansas dealing with the use of the HAI Model for estimating the cost of universal service, Topeka, Kansas, April, 1999.

"Utilizing the Total Element Long Run Incremental Costing Models (TELRIC) to Price Network Services," panel discussion session at the conference "Controlling and Allocating Costs in Telecommunications," Washington, DC, January, 1999.

Testimony before the Nevada Public Utilities Commission dealing with the use of the Nevada HAI Model to estimate the cost of unbundled network elements provided by Nevada Bell, Reno, Nevada, November, 1998. Preceded by written testimony and presentations to several workshops on the Nevada HAI Model.

Testimony before the Texas Public Utilities Commission dealing with appropriate inputs values to be used in the HAI Model Release 5.0a for estimating the cost of universal service, Austin, Texas, September, 1998.

Testimony before the Washington Utilities and Transportation Commission dealing with the appropriate methodology for estimating the cost of universal service, Olympia, Washington, September, 1998. Preceded by written testimony and rebuttal testimony.

Testimony before the Nevada Public Utilities Commission dealing with the use of the Nevada HAI Model to estimate the cost of unbundled network elements provided by Centel, Carson City, Nevada, August, 1998. Preceded by written testimony and presentations to several workshops on the Nevada HAI Model.

"Future Directions in Telecommunications," seminar for the University of Denver Telecommunications Workshop for ICG-Netcom, Denver, Colorado, July, 1998.

"The Internet and the Telecommunications Infrastructure: If It's Broken, Fix It," presentation to the ICA Summer Program, Boulder, Colorado, June 1998.

"Practically Applying the HAI Model and the Benchmark Cost Proxy Model," with Kevin Deno-Duffy, workshop at the conference "Exploiting Cost Allocation Strategies in Telecommunications," San Diego, CA, June, 1998.

Testimony before the Texas Public Utilities Commission dealing with the use of the HAI Model Release 5.0a to estimate the cost of universal service, Austin, Texas, June and March, 1998. Preceded by written direct testimony, rebuttal testimony, supplemental rebuttal testimony, supplemental testimony, and reply to supplemental testimony.

Testimony before the Minnesota Public Utilities Commission dealing with the use of the HAI Model Release 5.0a to estimate the cost of universal service, St. Paul, Minnesota, February, 1998. Preceded by written testimony, supplemental testimony, and rebuttal testimony.

"Hatfield Model Release 5.0 Model Description," principal author, published by the International Transcription Service, Washington, DC, December, 1997.

"The Emerging Telecommunications Infrastructure," Telecommunications Reports seminar, Washington, DC, December, 1997.

Testimony before the Colorado Public Utility Commission dealing with the use of the Hatfield Model 4.0 to estimate the cost of universal service, Denver, Colorado, December, 1997. Preceded by written direct testimony, supplemental direct testimony, and rebuttal testimony.

Presentation to the Oregon Public Utilities Commission workshop on cost proxy models dealing with the Hatfield Model 4.0, Salem, Oregon, November, 1997.

Testimony before the New Jersey Board of Public Utilities dealing with the cost of universal service and interexchange carrier access, Newark, New Jersey, October, 1997. Preceded by written testimony filed September, 1997.

Presentation to a Pennsylvania Public Utility Commission Universal Service Workshop dealing with the Hatfield Model 4.0, Harrisburg, Pennsylvania, October, 1997.

"Practical Applications of the Hatfield Model and Benchmark Cost Proxy Model," with James Dunbar, workshop at the conference "Exploiting Cost Allocation Strategies in Telecommunications," Atlanta, GA, September, 1997.

"The Great Debate: Exploring the Applicability of 'The Models'," participation in a panel discussion at the conference "Exploiting Cost Allocation Strategies in Telecommunications," Atlanta, GA, September, 1997.

"Hatfield Model Release 4.0 Model Description," principal author, published by the International Transcription Service, Washington, DC, August, 1997.

Presentation to the Colorado Public Utility Commission Staff and the Office of Consumer Counsel dealing with the Hatfield Model, Release 4.0, Denver, CO, July, 1997.

Testimony before the Washington Utilities and Transportation Commission dealing with the appropriate methodology for estimating the cost of unbundled network elements provided by incumbent local exchange carriers, Olympia, Washington, July, 1997. Preceded by written testimony, rebuttal testimony, and surrebuttal testimony.

Testimony before the Virginia State Corporation Commission dealing with the cost of unbundled network elements provided by Bell Atlantic of Virginia, Richmond, Virginia, June, 1997. Preceded by written testimony and rebuttal testimony.

"Emerging Telephone Networks and the Internet," Telecommunications Reports seminar, San Francisco, California, May, 1997.

Written Final Testimony submitted to the Colorado Public Service Commission dealing with the cost of universal local exchange service provided by local exchange carriers in Colorado, Denver, Colorado, May, 1997. Preceded by written Initial Testimony submitted in April, 1997.

Presentation to the Nevada Public Service Commission Cost Workshop dealing with the appropriate methodology for estimating the cost of universal local exchange service, Carson City, Nevada, April, 1997.

Presentation to the Colorado Public Utilities Commission Staff High Cost Fund Task Force dealing with the appropriate methodology for estimating the cost of universal local exchange service, Denver, Colorado, March, 1997.

"Hatfield Model Release 3.1 Model Description," principal author, published by the International Transcription Service, Washington, DC, February, 1997.

Presentation to the Washington Utilities and Transportation Commission staff dealing with proxy cost models, and Hatfield Model Release 3, Olympia, WA, February, 1997.

Presentation to the Federal-State Joint Board on Universal Service dealing with Version 3 of the Hatfield Model, Washington, DC, January, 1997.

Testimony before the New Jersey Board of Public Utilities dealing with the cost of unbundled network elements in connection with the generic arbitration proceeding, Newark, NJ, January, 1997. Preceded by written testimony.

Testimony before the Washington Utilities and Transportation Commission dealing with the cost of unbundled network elements in connection with MCI's arbitration case vs. U W West, Olympia, WA, November, 1996. Preceded by written testimony.

Testimony before the Commonwealth of Massachusetts Department of Public Utilities dealing with the cost of unbundled network elements in connection with MCI's arbitration case vs. NYNEX, Boston, MA, November, 1996. Preceded by written testimony.

Testimony before the New Jersey Board of Public Utilities dealing with the cost of unbundled network elements in connection with MCI's arbitration case vs. Bell Atlantic of New Jersey, Morristown, NJ, November, 1996. Preceded by written testimony.

Testimony before the Texas Public Utilities Commission dealing with the cost of unbundled network elements in connection with AT&T's and MCI's consolidated arbitration case vs. GTE, Austin, Texas, November, 1996. Preceded by written testimony.

"Emerging Telephone Networks and the Internet," Telecommunications Reports seminar, Washington, DC, October, 1996.

Testimony before the New York Public Service Commission dealing with the cost of unbundled network elements in connection with MCI's arbitration case with NYNEX, Albany, NY, October, 1996. Preceded by written testimony.

Testimony before the Washington Utilities and Transportation Commission dealing with the cost of unbundled network elements in connection with three arbitration cases: AT&T vs. U S West, AT&T vs. GTE, and MCI vs. U S West, Olympia, WA, October - November, 1996. Preceded by written testimony and rebuttal testimony.

Testimony before the Utah Public Service Commission dealing with the cost of unbundled network elements in connection with AT&T's arbitration case vs. U S West, Salt Lake City, UT, October, 1996. Preceded by written testimony.

Presentation on the Hatfield Model to the arbitrator in the Massachusetts arbitrations of AT&T and MCI vs. NYNEX, Boston, MA, October, 1996.

Testimony before the Texas Public Utilities Commission dealing with the cost of unbundled network elements in connection with AT&T's and MCI's consolidated arbitration case vs. Southwestern Bell, Austin, Texas, October, 1996. Preceded by written testimony.

Testimony before the California Public Utilities Commission dealing with the cost of unbundled network elements in connection with four arbitration cases: AT&T vs. Pacific Bell, AT&T vs. GTE, MCI vs. Pacific Bell, and MCI vs. GTE, San Francisco, California, September - October, 1996. Preceded by written testimony and rebuttal testimony.

Local Telecommunications Cost Modeling: Theory and Practice, coauthored with Richard Chandler and A. Daniel Kelley, presented at the Twenty-Fourth Annual Telecommunications Policy Research Conference, Georgia, September, 1996.

Testimony before the New Jersey Board of Public Utilities dealing with the cost of unbundled network elements in connection with AT&T's arbitration case with Bell Atlantic of New Jersey, Newark, New Jersey, September, 1996. Preceded by written testimony.

Testimony before the New Jersey Board of Public Utilities dealing with the cost of basic local exchange service, Newark, New Jersey, September, 1996. Preceded by written testimony and rebuttal testimony.

Testimony before the California Public Utilities Commission dealing with the state of local exchange competition, San Francisco, California, August, 1996. Preceded by prefiled written testimony and rebuttal testimony.

Presentations on the Hatfield Model to the staffs of the Federal-State Joint Board on Universal Service, Iowa Department of Commerce Utilities Board, Texas Public Utilities Commission, New Jersey Board of Public Utilities, and New York Public Service Commission, July-August, 1996.

"Overview ... Let the Games Begin," Participation in a panel discussion at the Telecommunications Reports Conference on Interconnection and the Competitive Checklist, Washington, DC, June, 1996.

"Local Loop Competition," talk presented to ICA Summer Program, University of Colorado, Boulder, CO, June, 1996.

Testimony before the Utah Public Service Commission dealing with a methodology to estimate the cost of universal service provided by U S WEST in the state of Utah, Salt Lake City, Utah, May, 1996. Preceded by prefiled written testimony and surrebuttal testimony.

Testimony before the California Public Utilities Commission dealing with the estimated cost of basic telephone service provided by Pacific Bell and other local exchange carriers in the state of California, San Francisco, California, May, 1996. Preceded by prefiled written testimony, rebuttal testimony, and surrebuttal testimony.

Testimony before the Maryland Public Service Commission dealing with the cost of local exchange service in the state of Maryland, in conjunction with MCI's Competition Plus initiative, Baltimore, MD, April, 1996, preceded by prefiled written testimony and surrebuttal testimony.

"A Look at the Future: Business and Industry Experts Discuss the Implications of the Act," participation in a panel discussion at the conference "The Telecommunications Act of 1996," Denver, Colorado, March, 1996.

Presentation to the Ministry of Communications and Transportation of Mexico on Telmex' costs to provide interconnection to long distance carriers, Mexico City, Mexico, March, 1996.

Testimony before the Pennsylvania Public Service Commission dealing with a methodology to estimate the cost of universal service provided by Bell Atlantic of Pennsylvania and other local exchange carriers in the state of Pennsylvania, Harrisburg, PA, March, 1996. Preceded by prefiled written testimony, rebuttal testimony, and surrebuttal testimony.

Testimony before the Colorado Public Utilities Commission dealing with a methodology to estimate the cost of universal service provided by U S WEST and other local exchange carriers in the state of Colorado, Denver, Colorado, February, 1996. Preceded by prefiled written testimony.

"Overview of Enterprise Network Developments," IEEE Communications Magazine, January, 1996, p. 30.

Testimony before the Washington Utilities and Transportation Commission dealing with the cost of local exchange service provided by U S WEST in the state of Washington, Seattle, Washington, January, 1996. Preceded by prefiled written testimony, amended testimony, and surrebuttal testimony.

Testimony before the Maryland Public Service Commission dealing with Bell Atlantic's cost of providing basic local exchange service in Maryland, August, 1995. Preceded by prefiled written testimony.

"Modeling Basic Universal Service for Pennsylvania," with A. Daniel Kelley, presentation to the staff of the Pennsylvania Public Service Commission, Harrisburg, PA, July, 1995.

"A Model For Determining the Cost of Basic Universal Service in Pennsylvania," with A. Daniel Kelley and R. Chandler, paper submitted to the Pennsylvania Public Service Commission in Docket L-00950101, Harrisburg, PA, July, 1995

"ONA: A Promise Not Realized -- Reprise," with A. Daniel Kelley, paper filed by MCI Communications Corporation and others in the FCC's Notice of Proposed Rulemaking in the Computer III Remand Proceeding, Washington, DC, April, 1995.

Declaration (no title) filed by California Cable Television Association with the Federal Communications Commission in connection with Pacific Bell's Section 214 Applications to construct Video Dialtone facilities, Washington, DC, April, 1995.

"Emerging Carrier Technologies & Architectures," Telecommunications Reports seminar, Washington, DC, March, 1995.

"Evolving the Physical Network," seminar session at the ICA Annual Conference, Anaheim, CA, March, 1995.

Affidavit (no title) filed by California Cable Television Association with the Federal Communications Commission in connection with Pacific Bell's Section 214 Applications to construct Video Dialtone facilities, Washington, DC, January, 1995.

"Fast Lane or Frontage Road: The State of the Infrastructure," Experts' Panel Discussion at the Convergence '94 Conference on Opportunities on the Information Superhighway, Washington, DC, November, 1994.

"Telecomm Fundamentals," pre-conference seminar presented at the Convergence '94 Conference, Washington, DC, November, 1994.

"Telecommunications Technology" and "Utility Applications of Telecommunications," chapters in report titled "Business Opportunities and Risks for Electric Utilities in the National Information Infrastructure," published by the Electric Power Research Institute, Palo Alto, CA, October, 1994.

Testimony before the Illinois Commerce Commission dealing with AT&T's proposal on conditions to test the potential for local exchange competition, and Ameritech's proposed Customer First Plan, Chicago, IL, October, 1994. Preceded by prefiled written testimonies concerning the two proposals, rebuttal testimony, and surrebuttal testimony.

"Predictions and Outlook for Reinventing the 'Last Mile' in View of New Applications and Technologies," Experts' Panel Discussion at the Telecommunications Reports Conference on New Local Loop Technologies and Applications, Washington, DC, October, 1994.

"Emerging Local Loop Technologies and Architectures," Telecommunication Reports seminar, Washington, DC, October, 1994.

"VSATs Link Far-Flung LANS," with S. Kroder, Business Communications Review, October, 1994, p. 51.

"Emerging Local Loop Technologies and Architectures," Telecommunication Reports seminar, Washington, DC, October, 1994.

"VSATs Link Far-Flung IANS," with S. Kroder, Business Communications Review, October, 1994, p. 51.

"The Cost of Basic Universal Service," talk presented to the National Association of Regulatory and Utility Commissioners (NARUC) Summer Meeting, San Diego, CA, July, 1994.

"Technical and Economic Issues in the Further Notice," with A. Daniel Kelley, paper filed by Time Warner Entertainment Company in the FCC's Further Notice of Proposed Rulemaking, Docket 94-28, Washington, DC, July, 1994.

"Applying Network Architectures," talk presented to ICA Summer Program, University of Colorado, Boulder, CO, June, 1994.

"Evolution of Access Providers and Carrier Technologies," talk presented to ICA Summer Program, University of Colorado, Boulder, CO, June, 1994.

"The Vision and Reality of Cable Television Company Entry into Telecommunications," paper prepared for and filed by the Maryland Cable Television Association in connection with Maryland Public Service Commission Case No. 8587, Baltimore, MD, June, 1994.

Affidavit (no title) filed by the California Cable Television Association with the Federal Communications Commission in connection with Pacific Bell's Section 214 Applications to construct Video Dialtone facilities, Washington, DC, June, 1994.

"Choosing an Effective Network Migration Strategy," talk and panel moderator for session at ICA Expo '94, Dallas, TX, May, 1994.

"Management of the Enterprise Network: SNMP, SMP, CMOT," talk presented to the ICA Expo '94, Dallas, TX, May, 1994.

"The Information Superhighway: The Next Business Frontier," Denver Business & Economics Council panel discussion involving self and others, Denver, CO, April, 1994.

"Telecommunications Developments," talk presented to Canadian Cable Television Association Strategic Planning Committee, Nassau, Bahamas, April, 1994.

"Emerging Local Loop Technologies and Architectures," Telecommunication Reports seminar, Washington, DC, April, 1994, with D. Hatfield.

"Telecommunications Technology - Today and Tomorrow," talk presented to the EFT Association Annual Conference, Tysons Corner, VA, March, 1994.

Affidavit (no title) filed by California Cable Television Association with the Federal Communications Commission in connection with Pacific Bell's Section 214 applications to construct Video Dialtone facilities, Washington, DC, March, 1994.

"The Enduring Local Bottleneck: Monopoly Power and the Local Exchange Carriers," with Economics and Technology, Inc., published report, February, 1994.

"Emerging Local Loop Technologies and Architectures," Telecommunication Reports seminar, Washington, DC, December, 1993, with D. Hatfield.

"Understanding Telecommunications Technology for the Cable Television Professional," post-conference tutorial presented at the Convergence '93 Conference, Washington, DC, November, 1993.

"Regulatory Parity and Public Policy," paper filed by Time Warner Entertainment Company as part of its Reply Comments in FCC docket MM Docket 93-215, September, 1993, with A. Daniel Kelley.

"Further Views on the Role of CEI/ONA," paper filed by Unitel Communications Inc. as part of its Amendments to Evidence in the Canadian Radio-television Telecommunications Commission (CRTC) Public Notice 92-78, September, 1993.

"The Basics of Numbering, Dialing, and SS#7-Based Call Routing," tutorial presented at the Telecommunication Reports Conference on Telecom Numbering and Portability, Washington, DC, August, 1993.

"Overview and Analysis of Numbering Issues," talk presented at the Telecommunication Reports Conference on Telecom Numbering and Portability, Washington, DC, August, 1993.

"Enabling Technologies for the Cable-Based Electronic Superhighway," talk to the CableLabs Conference on Visions of the Electronic Superhighway, Breckenridge, CO, July, 1993.

"Data Communications and Network Developments," CableLabs, Inc. seminar, Denver, CO, July, 1993.

"Emerging Hybrid Network Environment," talk presented to the ICA Summer Program, University of Colorado, Boulder, Colorado, June, 1993.

"Understanding Telecommunications Technology for the Cable Television Professional," pre-conference tutorial presented at the Convergence '93 Conference, Denver, CO, May, 1993.

"Technological Perspective: Advances in Technology That Have Formed the Basis for Local Competition," talk presented at CompTel's Educational Seminar on Competitive Local Access, New Orleans, LA, May, 1993.

"Cross-Subsidy Concerns Raised by Local Exchange Carrier Provision of Video Dial Tone Services," paper filed as part of a petition by the National Cable Television Association to the Federal Communications Commission, Washington, DC, April, 1993, with A. Daniel Kelley.

"AIN Interconnection -- A Non-Regulated Provider View," talk presented at the AIN ComForum session on the regulatory and policy aspects of AIN, Denver, CO, March, 1993.

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**BEFORE THE  
PUBLIC UTILITIES COMMISSION OF OHIO**

<p>In re:</p> <p>IN THE MATTER OF ICG TELECOM GROUP, INC.'S PETITION FOR ARBITRATION OF INTERCONNECTIONS RATES, TERMS AND CONDITIONS AND RELATED ARRANGEMENTS WITH AMERITECH OHIO</p>	<p>Case No. 99-1153-TP-ARB</p>
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**EXCERPTS FROM  
DIRECT TESTIMONY  
OF MICHAEL STARKEY  
ON BEHALF OF  
ICG TELECOM GROUP, INC.**

**[NOTE: PAGES 27-29 OF 76 PAGES  
OF TESTIMONY ARE ATTACHED]**

**NOVEMBER 29, 1999**