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Title: RADIO AND INTERNET: REGULATION ISSUES PAST AND PRESENT

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This paper examined, analyzed, and compared the discussion of regulation of two communication systems: radio communication (known first as wireless telegraphy, radio, and eventually radio broadcasting) from 1904 to 1927, and Internet communication from 1958 to 1996. Furthermore, the paper examined the library profession's contribution to these regulation discussions, and the extent to which this contribution reflected this profession's mission.

Key participants, the structure of the discussion process, and key issues were compared and contrasted to learn (1) whether similarities from both discussions outweighed the differences; (2) whether early radio regulation proved an acceptable historical analogy in which to view the discussion of Internet regulation; and (3) whether participants of the Internet discussion in 1996 reached the same conclusions reached in 1927. The comparison revealed similarities and differences in thought, process, and action that consisted of tensions between liberty and order, yet decision makers' concerns for commerce outweighed concerns for liberty in both discussions.

The library profession's contribution to the discussions was only evident in the Internet regulation discussion. The author could not determine from the available records whether the library profession was directly involved in the discussion of radio regulation. However, what is well documented is that this profession utilized both media to promote their mission of service and accessibility of collections and information in general to their users.

RADIO AND INTERNET:

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Thesis Statement/Guiding Questions

This paper examines, analyzes, and compares the discussion of regulation of two communication systems: radio communication (known first as wireless telegraphy, radio, and eventually radio broadcasting) from 1904 to 1927, and Internet communication, from 1958 to 1996. Furthermore, it attempts to determine the library profession's contribution to these discussions of regulation and the extent to which this contribution reflected this profession's mission.

The first chapter traces the development of the two technologies and the context within which each developed, and describes the research methodology and literature review for this study. The second and third chapters identify key participants, the structure of the discussion process, the key issues discussed, and the extent of the library profession's involvement in regulatory discussions for radio and Internet, respectively.

The final chapter compares and contrasts the discussions and addresses three questions: (1) Do the similarities of discussion between radio and Internet outweigh the differences?, (2) Does the history of early radio regulation prove an acceptable historical analogy in which to view the discussion of Internet regulation?, Why or why not?, and (3) Are the participants of the Internet discussion in 1996 reaching the same conclusions reached in 1927?

Comparing the two media

The reason this author chose to examine the two media is that they developed in similar ways. Both media began as point-to-point, interactive communication systems. Radio sent Morse Code messages intended for individual recipients, and the Internet began with electronic mail.

Both media were eventually distributed and adopted on a mass scale. Primarily used by commercial wireless inventors, entrepreneurs, and the military, radio eventually entered the home through amateur operators at first, and then through general households when broadcasting appeared. Computers were the instruments of those in the military and higher education studying the science of computations and later networking, as well as corporations, such as financial institutions who used computers for data processing. Later, computers became the networked communication fixture known as the Internet, and made its way into many homes after the World Wide Web appeared on the scene.

Both media eventually had the ability to broadcast their messages. Radio did so, at first via department stores, religious organizations, universities, newspapers, and power companies, but eventually on a centralized scale through programs controlled by large broadcast companies. The Internet did so, however, through decentralized websites posted by many—companies, educational institutions, as well as the individual. Finally, the library profession used both media as tools for providing information to their patrons. Given the similarities between the development of radio and the Internet as communication media used to reach a mass audience, it would be interesting to compare and learn if the policy and regulation decisions were also found to be similar in terms of key issues, key participants, and library involvement.

Alternately, it is also important to understand why this author does not include other communication media such as the telephone and television in this discussion. Even though the telephone and the television became part of almost every home in the United States, these media do have aspects not shared with radio and the Internet. The telephone eventually diffused to nearly every home and was an interactive communication system,

but it never became a broadcast medium. The television, although it became a broadcast medium, did not evolve as an interactive communications medium on a mass scale by the time of the Telecommunications Act of 1996.

Methodology

This study relied primarily on print materials, which were used to establish the historical foundation, social and cultural context, and chronology of the regulation discussions. Specifically, these materials included books, journal and magazine articles written by communication theorists, library and information professionals, historians, social scientists, and those in the radio trade. Also reviewed were doctoral dissertations that specifically addressed the aspect of regulation of radio and Internet during the period under consideration.

Primary materials comprised another portion of the data and included United States federal government documents, archival papers, and newspaper articles. Government documents, in the form of hearing transcripts, reports, and congressional records, were used extensively to establish the perspective of those involved with the decision-making process of the regulation discussions. Papers specifically addressing Mr. Hoover's activities as Secretary of Commerce (1921-1928) were obtained from the Herbert Hoover Presidential Library in Iowa. The archives at the University of Illinois provided copies of papers from the Radio Broadcasting Committee of the American Library Association from the early 1920s onward. Newspapers from both time periods were also used to establish the perceptions and contributions of the popular press.

Assumptions

Assumptions largely comprise definitions for clarity of discussion.

- Wireless, wireless telegraphy and radio telegraphy, refer to transmissions using Morse Code (primary method of radio transmissions in use up to approximately 1921).
- Radio and radio broadcasting refer to transmissions using voice, or telephony, which became the popular method of transmission after 1921/1922.
- Internet is defined as the point in time that Transmission Control Protocol/Internet Protocol (TCP/IP) was adopted as the software standard by the networks connected to ARPANET in 1982. This networking protocol replaced previous protocols that allowed messages to be sent/received between different computer networks.
- World Wide Web is understood to be a more recent invention that is part of the Internet. It is not to be confused as the Internet. The World Wide Web is software that provides the ability to locate and obtain information on different computers through a system of links, and is distinct from other utilities on the Internet, such as email.
- Network is not necessarily synonymous with the Internet. The term *network* also refers to technology systems of the wireless, radio and radio broadcasting, and computers, as well as the Internet.
- Radio and the Internet are understood to be defined as mass communication media.
- Regulation is understood to mean actions taken by the federal government to determine acceptable use, and as used in this thesis is synonymous with policy and/or communication policy.

- Private sector, corporate sector, commercial, and industry are terms used interchangeably to describe those users that are engaged in commerce.
- Library profession is understood to mean individuals practicing in the profession, institutions such as the Library of Congress, public libraries, school libraries, academic libraries, and professional associations such as the American Library Association and the Association of Research Libraries.

Delimitations

This descriptive study is limited to the topic of regulation in the social context of the people involved. No discussion of the technical aspects of the technology is included insofar as technical aspects are briefly discussed in this chapter as part of the general background of the research. No discussion of other subsequent technologies such as the telephone, television, or cable television is included.

The issues surrounding regulation will be discussed only in the context of the discussions being analyzed, and will not include analysis of the issues themselves. Although there may be brief references to international regulation, the discussion will focus only upon regulation in the United States. Finally, no predictions regarding trends in regulatory change beyond 1996 are part of this descriptive study.

Review of the Literature

A review of the literature led this author to group the secondary materials into four broad categories: 1) Radio & Internet, 2) Radio, 3) Internet, and 4) the Library profession. Included in these categories are specific, as well as general, discussion on topics which relate directly to the four broad categories. These topics are law/policy/regulation, and information infrastructure. Finally, works that touch on the

theoretical concepts of media, and mass communication and telecommunications will ground the discussion from the point of view of information and communication.

To date, the author has been able to locate only a handful of written materials that specifically compare early radio and radio broadcasting of the 1920s with the Internet of 1996. These materials are articles from academic journals, popular magazines and newspapers, and show thought on the striking parallels in not only the development of the media, but also the social aspects. These works compare society's fascination and excitement with the media when they were new; discuss business and economic aspects such as stock market growth; marvel in the capabilities of simultaneous communication on a global scale; and describe the *craze* or *boom* of each medium's popularity with the public and with industry. Some discussed the emergence of the media as systems of mass communication; and of course the eventual involvement of government in the form of regulation—however, only in a broad sense (Hargittai, 2000; Lappin, 1995; Lardner, 1999; Martin, 1998).

Moschovitis (1999) and Naughton (1999) provide a great chronology and history, respectively, of the development of the Internet, while Winston (1998) and McChesney (1996) cover both media. Chandler (2000) writes about information in the United States since colonial times, and provides an excellent history of computer and Internet development. The bulk of the regulation discussion for the Internet came from Ogden Michael Forbes' work (1995), federal government documents in the form of congressional records, as well as House and Senate hearings and reports.

The next groups of literature address the topics of radio and the Internet separately. These comprise books, journal articles, and doctoral dissertations which

cover history and chronology, social and cultural aspects, and the economic and political climate of the time periods. The works of Douglas (1987), Howeth (1963), Bensman (2000), Rosen (1975), Benjamin (2001), Aitken (1994), and Godfrey (1975), cover the history of radio from various points in its history, and include extensive discussion of regulation of radio communications. Czitrom (1982) provides an analysis on American society's reaction and responses to new media of the late 19th and early 20th century which include chapters on the wired telegraph and radio broadcasting. Federal government documents in the form of congressional records, and House and Senate hearings records and reports were also part of this group.

The areas of law, policy, or regulation are largely found in articles and books in communication and law. Mander (1984) does an excellent job of presenting models used in the discussion of regulation for radio in the 1920s. She shows how the concept of information moving through the medium in a broadcast method was perceived in transportation, public utilities, and newspaper press metaphors. McChesney (1996) compares the concept of policy-making for the Internet with the historical model for radio regulation of 1927. He points to similarities in this comparison, but does not see the Internet traveling the same path of radio broadcasting regulation of 1927, primarily because he views the Internet as having the potential for greater democratic possibilities. However, McChesney refers to the Internet's problems of the private industry market conflicting with concepts of democracy, and this is a strong similarity that the Internet's time period shares with that of the radio of the 1920s.

Kenneth Creech (2003) and Frank J. Kahn (1984) have written on electronic media law and regulation and discuss the laws that regulate broadcasting. Carl Zollman

(1930) provides a compilation of court cases on law regarding the airwaves from the 1920s, and Harry Frease (1934), writes on the relationship of transportation, transmission, and information as part of commerce in constitutional law.

In the area of materials of the professional library community, it is Bostwick (1910) and Haugland (1992) that provide the basis for the profession's mission, and the information pertaining directly to the library profession's use of radio in the 1920s, respectively. Haugland's notes provide a list of library professional magazines, publishing trade magazines, popular magazines, and radio trade magazines that warranted further investigation into the library journals of the time period. Further investigation revealed radio use did indeed fulfill a mission of service to communities. This mission was recognized little more than a decade earlier in 1910, and indicated that the American library profession was changing its aims and duties from entities of only storage and protection to making collections accessible to communities (Bostwick, 1910, pp. 1-4).

Unfortunately, a review of the archive materials from the Herbert Hoover papers, and the papers of the American Library Association failed to reveal any direct involvement by the library profession in the discussion of the regulatory issues of radio communications. However, the works of Parkhurst (1990) and Turock (1996) provide an extensive description of the Library profession's mission and involvement with the discussion to regulate the Internet. Lynch (1994, 1995) provides excellent articles on the library profession's perspective of Internet and the environment in which it developed, as well as addressing the use of past analogies as models for policy or regulation.

Carey (1975, 1989), Pool (1983), and Lessig (1996, 1999) provide foundation and insight on the concepts of communication theory with transportation, commerce, culture,

and law. These scholars show how the decisions of regulation were historically based in commerce. They show that regardless of all the similarities and differences found in the comparison and contrast of discussion issues a three-sided discussion has persisted in reconciling liberty, order, and commerce in communication regulation and policy.

General Background of the Two Time Periods

The issues surrounding the regulation of the Internet in the United States during the late 20th century are similar to those issues that surrounded the regulation of radio in the United States in the early 20th century. These issues represent a balancing act for opposing interests regarding the regulation for these media in their respective time periods: a) private sector competition/monopolistic, or government control, b) universal access/service, or intellectual property protection, c) privacy/security or freedom of speech, and, of course, d) public vs. private funding. In addition, libraries used both media as tools for providing greater access to information in the respective time periods. As librarians adopted the Internet as a tool to provide access and delivery of information to their audiences in the late 20th century, librarians used radio for promoting books to their audiences of the early 20th century, and librarians in both time periods worked to harness the powerful force of these media to promote this profession's mission (Haugland, 1998, p. 70).

Telegraph

The similarities of the regulation issues of these media, the Internet and the radio, derive from similarities of their technological development and evolution of their use by society. Both technologies stem from a common 19th century ancestor: the electric telegraph. This invention allowed newly discovered electricity to carry coded messages

in the form of dots and dashes [Morse Code] across a wire, and across great distances. The telegraph is the technology in which "people first experienced the novelty of direct communication over long distances..." (Moschovitis, 1999, p. 5; Winston, 1998, p. 19), and according to Czitrom "formed the first of the great communication networks" (1982, p. 3).

Czitrom (1982) emphasizes that the telegraph represented the beginnings of the separation of communication from transportation, because the new medium began to deliver information without a physical messenger (p. 3). However, the telegraph worked closely with transportation industries, as the railroad used the telegraph initially for managing the movements of trains within its infrastructure of rails (Winston, 1998, p. 26-27). Later, stock speculators, newspapers, bankers, wholesale and retail businesses made great use of the telegraph, and since it was not to be controlled by the government, what followed was the building of telegraph companies, patent lawsuits, and duplicated lines across the country (Czitrom, 1982, p. 6; Winston, 1998, pp. 28; Duboff, 1984, p. 55).

Samuel F. B. Morse wanted to sell his patent to the U.S. government around 1845. However, at that time, the U.S. government could not foresee any use for the telegraph outside of the railroad need, and consequently decided not to obtain Morse's patents (Winston, 1998, p. 27; Czitrom, 1982, p. 6). The federal government set a "privatising [sic] precedent" in U.S. communications policy by not purchasing the patents on his invention (Winston, 1998, p. 27; Czitrom, 1982, p. 6).

Issues that arose from the economic development of the telegraph were those of corporate power, monopoly, and federal government control. The U.S. Congress deliberated over many bills proposing to reform the telegraph system under federal

government's Postal Service via several committees and hearings, because reformers wanted to democratize the telegraph. The legislation that emerged was the Telegraph Act of 1866 (Czitrom, 1982, p. 4, 27-28; Duboff, 1984, p. 59-60). While it did not regulate the industry, the federal government provided aid for the construction of telegraph lines, and also secured a priority of federal government transmissions over that of those of all other businesses (Pensacola Telegraph Company v. Western Union Telegraph Company, 1978, p. 709; Bensman, 2000, p. 3). Consequently, there existed the tension between commercial businesses needing the support the federal government provided, but not wanting the intervention into the running of its business.

Two significant items must be noted from the Telegraph's time period. The first is that although the federal government did not establish national ownership of the entire communications system through legislation, it did play a role in supporting the industry by providing land grants to railroads, and monies for the construction of telegraph lines. Furthermore, the military realized it as an essential tool during the Mexican War in 1846, and the U.S. Civil War in 1861 (DuBoff, 1984, pp. 60-61).

The second item is that the U.S. Supreme Court identified telegraph transmissions as commerce in 1878. Chief Justice Waite stated the telegraph "had changed the habits of business and become one of the necessities of commerce" (Pensacola Telegraph Company v. Western Union Company, 1878). Waite listed many of the effects the telegraph made on business such as the selling of goods, the paying of orders, the making of business contracts, the directing of maritime traffic, and announcement of markets abroad—all by telegraph (pp. 710-711). Consequently, such commerce activity fell under the control of Congress. He emphasized that these powers of Congress are not

confined to the instruments of commerce in use at the time the Constitution was written, but that these powers extend to "new developments of time and circumstances" (p. 710).

Wireless Telegraphy

Wireless telegraphy was the invention that allowed electricity to carry coded messages through the air, without the aid of wires. Scientists and inventors of the early 20th century improved the technology, always concentrating upon the components of wireless systems to increase the distance and speed at which messages traveled (Douglas, 1987). These scientists and inventors progressed from induction coil, spark gap, and metal plates to alternators that increased the frequency waves, to crystals and vacuum tubes (Douglas 1987, pp. 13-47, 195-196).

Of wireless technology, the inventors, the press, the amateurs (forerunners of the ham radio operators), and the federal government had their own vision of the future. The inventors saw the potential for commercial use; the press envisioned a democratic wireless (minus any hint of government regulation); the amateur wireless operators worked to democratize the airways; and the government or military did not perceive a need for involvement until they realized the impact of the international efforts (Douglas, 1987, pp. 66, 122, 196, 124). Later, as the value of the wireless technology was realized, the government encountered requests for regulation reform discussing the issues of property rights, access to the medium, and copyright (Benjamin, 1998).

One inventor, Guglielmo Marconi, in the late 1800s/early 1900s, saw a need for steamships to have the capability of ship-to-shore communication, and established a network of wireless systems for companies in England and the United States. His sole intention was to create a monopoly of communications (Douglas 1987, pp. 66-67, 101).

The U.S. Weather Bureau was excited about the new technology and initially worked with Reginald Fessenden, a scientist and inventor, to use wireless for predicting floods, storms, hurricanes, and established three stations along the mid-Atlantic seaboard. Although Fessenden later ended this relationship, the U.S. Weather Bureau still used wireless technology, and by 1928 worked with stations across the continent and planned for the creation of daily weather maps (Martin, 1929, p. 64-66).

Another inventor and scientist, Lee DeForest secured a contract with the United Fruit company in 1904 and 1907 that operated in Latin America to provide a reliable communication system for their organization (Douglas 1987, pp. 95-96). Although the new technology had problems, such as interference from factors such as weather, the company continued to work with DeForest, since a wireless system with problems was better than no communication system at all (Douglas, 1987, p. 95-96).

In 1899 the press marveled at the past century in which distance, time and uncertainty had been conquered by technology—primarily railroads, telegraph and steam vessels (Douglas, 1987, p. 7). When wireless telegraphy came on the scene, the press viewed the new technology as miraculous, and envisioned that this medium would provide the saving of lives, mutual understanding in society, reduce loneliness and isolation, restore a sense of community, weaken monopolies, and allow "Americans… to take modern communications into their own hands" (Douglas, 1987, pp. 26-27). At the same time the press also pictured that wireless technology would also expedite commerce, bolster the military, and, of course, improve the economic goals of the press (Douglas, 1987, p. 27).

The development of the crystal radio set, around 1906, gave access of the airwaves to more than just the inventors, corporation, press or government. The crystal radio set made radio equipment affordable to the general population and "contributed more than any other component to the democratization of the wireless" (Douglas, 1987, p. 196). A network of amateur operators, mostly young middle-class males, began to form, grow and dominate the airwaves. The airwaves were a virtual world to these amateurs. Many built their own radio sets, communicated among themselves, as well as with commercial operators at sea, and often performed a much needed service in emergency situations when telegraph and telephones lines were rendered inoperative because of weather (Douglas, 1987, p. 198, 206).

By 1914, the magazine *Popular Mechanics* described "a new epoch in the interchange of information and the transmission of messages." *Popular Mechanics* recognized that it was the wireless technology that gave power to the private citizen without assistance by the government or corporation (quoted in Douglas, 1987, p. 206). The amateurs were also considered hackers of the airwaves (sometimes unfairly); their growth in numbers added to the interference problems that corporations and the military experienced, and eventually led to regulation in 1912 that licensed operators and assigned them to a specific frequency range (Douglas, 1987, p. 234). According to Douglas (1987), the airwaves were crowded at this time, and no guidelines, regulation or law existed for establishing priority or space in the air (p. 209). The issues of property rights, access to the medium, and later copyright would appear and reappear to the U.S. Congress many times in legislation requests in the early 1900s.

The first appreciation for the need for federal government's role as regulator of wireless technology came from Americans who attended the 1903 International Wireless Conference. The Americans realized that other countries were ahead in developing and controlling wireless technology, and that airwaves knew no boundaries. The Americans began to understand that the federal government efforts were inferior, by comparison, in the areas of developing and controlling wireless technology.

The year 1904 represented the first year the U.S. government took action to remedy this situation. In 1904 Theodore Roosevelt saw the need for the Navy to have a reliable communication system and appointed an Interdepartmental Board of Wireless Telegraphy whose charge was to report on determining how government could consolidate and manage wireless for the federal government stations, and determine how government and private companies could operate wireless "harmoniously." The board recommended control by the U.S. Navy; however, no legislation was enacted. Another international conference in 1906 discussed issues of wavelengths and bands for different seagoing vessels, universal distress signal, and a body for arbitration of disputes. Although no guidelines, regulation, or law existed prior to the first radio legislation of 1910, requests for regulation of the wireless spectrum in the U.S. occurred prior to the Wireless Act of 1910 and continued through to the Radio Act of 1927. The U.S. Navy had control of the medium during World War I, but ended up relinquishing much of that control after that war ended under pressure from the public and corporate arenas (Douglas, 1987, p. 319).

The issues that continued after the war were largely the same as before the war: limiting admission to the spectrum, claims to the spectrum, and rights to transmit in a

given area. Essentially, the focus for regulation was ownership of the airways, public or private. However, Congress had a difficult time addressing property rights to the wireless spectrum because the "air" was considered a free resource (Douglas, 1987).

The Wireless Act of 1910 and the Radio Act of 1912 were the result of disasters that happened at sea. The Act of 1910 required all ships to possess wireless equipment and a person skilled in using the equipment. The Act of 1912, in addition to requiring more aspects of safety, represented the first act to partition the spectrum by specific ranges of wavelengths and divide it into two arenas: private stations and government stations (Douglas, 1987, p. 234). However, this move was not interpreted as establishing property rights to the spectrum, primarily because is did not deny access to anyone (Aitken, 1994, pp. 690-691).

Due to the tragic loss of life in the disaster of the *Titanic*, the Act of 1912 required all radio operators be licensed, established technical guidelines for transmitters, required stations adhere to certain wavelengths, specify that distress calls to take priority over all other calls, reallocated amateurs to a specific part of the spectrum, and assigned the Secretary of Labor and Commerce the responsibility of issuing licenses and making other regulations regarding chaos or interference in the spectrum (Douglas, 1987, p. 234).

However difficult Congress found it to address the issue of property rights in the radio spectrum, the problem was not resolved by these two acts. The number of stations and users were increasing and popular broadcasting exploded after 1920 when voice began to be transmitted, and the spectrum grew more crowded (Aitken, 1994). More and more the spectrum of the radio was looked upon as a resource, but still not to be considered private property.

Eventually, the Radio Act of 1927 was enacted after several years of discussion and court cases. What resulted was an enigma. While stressing the importance of the radio spectrum as a public resource that needed protection, Congress allowed commercial exploitation of the spectrum. There were requests to regulate the spectrum, and cries to not allocate it as private property. There were cries against commercialization, yet Hoover worked closely with the large commercial players to draft the 1927 legislation that established the vision of the larger, corporate, commercial broadcaster which resulted in the smaller commercial broadcasters and the non-commercial broadcasters having a much smaller piece of the spectrum (Aitken, 1994, pp. 713-714; Benjamin, 1998).

The Library Profession's Mission and Use of Radio

In 1910 Arthur Bostwick noted that the aims and duties of libraries began to change from guarding and preserving books to making them accessible to the public. This change was to extend library services to an entire community (Bostwick, 1910, p. 3). Bostwick indicated that the library could not wait for customers to come through the doors of the library; the library had to be an active force in moving beyond the storehouse concept (p. 2). Within the next decade, the library profession began utilizing radio to extend their services to their communities, and continue to discuss the potential uses of this new medium (p.2).

Soon after radio broadcasting came into its own after 1922, transmitting voice and music program, the library institutions across the U.S. became involved in using the medium to extend a service to the people, and to increase the library's presence in the community. Many public libraries utilized local broadcasting stations for their program

delivery, but also broadcast from the large commercial stations such as Pittsburgh's KDKA owned by Westinghouse; WGY in Schenectady, New York owned by General Electric; and WRC in Washington, D.C. owned by RCA. Many academic libraries utilized their in-house broadcasting stations (American Library Association, 1926, p. 477; Radio broadcasting by libraries, 1927, p. 922; Use of radio by public libraries, 1924, p. 581-582; Tolman, 1923, p. 234). During the 1920s libraries provided such programs as reviews of books, readings from books, current events, story hours for children, talks on genealogy, and lists of the "best" books on various subjects.

These libraries were located in various parts of the country—Newark, New Jersey; Seattle and Tacoma, Washington; Boston, Massachusetts; Cincinnati, Cleveland, and Columbus, Ohio; Pittsburgh, Pennsylvania; Omaha, Nebraska; St. Louis, Missouri; Ames, Iowa; Milwaukee, Wisconsin; Buffalo, New York; State College, New Mexico; San Diego, California; and Indianapolis, Indiana. In addition to libraries themselves, library associations also took advantage of radio broadcasting. The Library Association of Portland, Oregon had regularly broadcast seven to eight programs weekly (California State Libraries, 1922, pp. 266-267; A new kind of story-telling, 1922, p. 502; Use of radio by public libraries, 1924, p. 581-582; American Library Association, 1926, p. 477; Radio broadcasting by libraries, 1927, p. 922).

Public response to these broadcasts was positive and immediate. Libraries received responses from various people: grocers, butchers, cooks, the elderly, individuals with poor eyesight, invalids, and shut-ins. In addition, the libraries received calls for books at all their local branches the day after the broadcasts (Radio and the Library 1927, pp. 631-632).

The New York Library Association not only made use of the radio at one of their conventions, but also showed great interest in the medium for the library (Broadcasting and the library, 1923, p. 7). August H. Shearer, a past president of the American Library Association, is quoted as saying "The position of the library with regard to radio must be considered very soon and with great care. Already it has been discussed at the American Library Association and at the New York State meetings. The recent drop in circulation of books may be caused by interest in radio. But the library doubtless has a place in the broadcasting program" (Broadcasting and the library 1923, p. 8).

People in libraries and in radio, saw potential for linking libraries with radio. F. L. Tolman (1923), reference librarian with the New York State Library, suggested that libraries expand their services to their communities by placing the receiving sets in the library lecture halls to receive programs from various stations within reach. *Radio Broadcast* (Broadcasting and the library, 1923), a radio trade magazine, also suggested the same. *Radio Broadcast* understood the role of the library in the community, and saw a need for radio to not only be used by the library, but to also be placed *in* the library: "the library is a community center and it would be possible, under capable advice, to install a receiving set and loud-speaker in order that the townsfolk could listen-in on important speeches or other events broadcasted from cities within range" (pp. 6-7).

This article in *Radio Broadcast* also suggested librarians enlist radio amateurs for assistance because they have a working knowledge of the equipment (Broadcasting and the library, 1923, pp. 6, 7, 8). The article's author continued to impress upon the reader the political, religious, and educational impact which broadcasting made, not only nationally, but internationally—noting the current network of high-powered stations,

which increased the reach to countries of the world (p. 7-8). Consequently, what the press envisioned as a democratic medium that would provide mutual understanding in society, reduce loneliness, isolation, and restore a sense of community, was also shared by the many in the library profession, as the concept of broadcasting continued to develop.

However, just as there was anticipation and excitement over the potential use of this new technology, there was also anxiety. Even before the radio was used as a tool of libraries, it was perceived as a threat to reading, even before the technology of the wireless was demonstrated in the United States. Haugland notes an 1894 article published in Scribners magazine entitled "The End of Books," asserted that books would soon be replaced with sound recordings. This article anticipated authors making sound recordings of their own works (Haugland, 1998, p. 67, footnote). In the 1920s, some thought people would spend more time at listening to the radio than they would at reading books, and cited examples such as a listener, who, happy about the broadcast of book reviews, remarked that she would never need to read the books (Radio and the library, 1927, p. 631).

Yet it is interesting to note that in 1928, a year after the Radio Act of 1927 became law, an abstract of a talk by Charles H. Brown, of Iowa State College Library in Ames, Iowa, appeared in *Library Occurent* showing an excellent example of libraries continuing to extend their mission through radio (The library on the air, 1928, pp. 238-239). The published talk "outlined the objectives of the library in radio broadcasting" as increasing service by calling attention to material of interest to the listener, such as abstracting books, topics, and discussion, and encouraging reading and appreciation of

books. Additionally, services could also include providing assistance to individuals taking adult education courses, or needing information on the subject of training children, and providing talks to listeners preparing for a visit to Yellowstone (pp. 238-239).

However positive the responses were to the librarians' broadcasts, and however great the interest the librarians had for the potential use of the medium, Haugland (1992) believes libraries' broadcast programs were nothing more than promotion and marketing (p. 81). Haugland provides many reasons for this view. She points to tensions that existed between the pursuit of profits by broadcasters and non-profit entities. Broadcasters constituted not only manufacturing companies, but also newspapers, department stores, hotels, and publishers whose primary interests were sales and services. Non-profit entities whose primary interests were education, constituted religious institutions, colleges, universities, and public libraries (Haugland, 1992, p. 67).

The value of culture, specifically high-brow and low-brow, also affected the libraries lack of further pursuits. High-brow culture was associated with intellectual content, and promoted the use of books. Low-brow culture was associated with popular culture and entertainment via the radio (Haugland, 1992, p. 67). There were also reservations expressed by literary critics that believed people would prefer listening to a fifteen minute compressed version of a 300-page novel broadcast over radio, than reading the complete novel in hand (Haugland, 1992, p. 71, 81).

As much as the writers of *Radio Broadcast* urged libraries to use the radio inside the library in 1923, by 1926 these writers were less certain of using broadcasting to deliver education (quoted in Haugland, 1992, p.72). Royalty demands from the

American Society of Composers, Authors, and Publishers (ASCAP) curbed broadcasters' cooperation with libraries (Haugland, 1992, p. 69).

According to Haugland (1992) the radio promoted the book, but it did not provide "new forms of participation in it" (p. 81). Haugland perceived the inability to move beyond merely promoting reading materials as a result of the circumstances of the time. The 1920s saw a quick rise in a consumption-based economy, where motion pictures, parties, and motoring in automobiles were more popular. And even though the quantity of volumes was increasing in libraries, the reading circles and literary discussions were decreasing (p. 67). Haugland noted one study, published in 1930, indicated that the American population spent more time buying candy and entrance to movies, than it spent on checking out books from the public library (p. 78). Finally, once the structure of radio broadcasting was established with commercial interests having the greatest place in the spectrum, there was little room for non-profit and educational pursuits (p. 73).

Although Haugland saw only promotion and marketing through radio use, this author believes that the library professions' activities mentioned in the literature of the time, reflect, at the very least, the mission of service that Bostwick wrote about in 1910. There was effort and discussion to increase the library's presence in each community served and turn attention to the information needs of those communities. This profession worked to find a place for radio and use it as a tool to reach out to their communities and raise awareness of the information available in libraries.

Minutes from the American Library Association's 1924 Adult Education Board meeting reveal that the profession noted libraries' activities in radio broadcasting. However, the minutes merely describe library broadcasting activities. Unfortunately,

there is no evidence of discussion about issues such as regulation for the medium, nor defining their broadcasting role until December of 1928—after the Radio Act of 1927 was passed (Minutes from Adult Education Board 1924-1934). After all, during the 1920s, libraries, as well as broadcasters, were in the midst of defining their individual roles in radio at a time when the concept of broadcasting was, itself, new and undefined (Broadcasting and the library, 1923, p. 8; Rosen, 1975, pp. 55, 80; Bensman, 2000, p. 54).

Computer and Internet Development

The invention of the computer not only brought the capability of using electricity to move messages across a communication network, but eventually the capability to direct a message in isolation from other messages within the same network. Scientists and engineers worked to improve this technology that evolved from punch cards, sliding plates, vacuum tubes, and transistors, to compilers, integrated circuits, microprocessors, the personal computer, and to the software that created the capability of packet switching and hyperlinks (Moschovitis, 1999, pp. 13-29, 33-45). The progression of computer design changed from an electro-mechanical system of calculation to electronics that not only calculated, but also began to process, move, and store information within a network of users (Moschovitis, 1999).

The earliest computers had application to the public sector. Hollerith's electromechanical tabulating machines was used to tabulate the 1890 and 1900 census. The British built the Colossus, an electronic device used to decipher secret code during World War II. International Business Machines (IBM) worked with Harvard University to build the Mark I that was later used by the U.S. Navy for producing mathematical

tables. Remington Rand Corporation created the UNIVAC computer that was used by the U.S. Census in 1951. The UNIVAC had the capability of storage, and marked the beginning of commercial computing. In 1964, IBM created the SABRE computer system for airline reservation. This system, still in use today, operates in "real-time." Other airlines incorporated these systems through the 1960s, and in the subsequent decades, other industries such as banks, retailing, and the stock market adopted this type of system (Moschovitis, 1999, pp. 49-52).

By 1957, those in the United States government realized how far ahead the Soviets were in terms of space exploration by the launching of Sputnik. By 1958, Eisenhower created the Advance Research Project Agency (ARPA) under the oversight of the Department of Defense. J.C.R. Licklider, its new director, began to research the feasibility of connecting computers across long distances. In addition, Licklider began to establish a professional network of people from university science departments and research centers across the nation. As a result of the Eisenhower's initiative in 1958, the ARPAnet was created in 1969, and soon connected mainframe computers at the University of Utah, University of California at Los Angeles, University of California-Santa Barbara, and the Stanford Research Institute.

The personal computer was born in the mid-1970s for the purpose of making a computer affordable to individuals. Email, bulletin boards, and chat rooms begin to appear in the late 1970s; however, most people who used them were computer scientists and hobbyists (Moschovitis, 1999, p. 93). The expanded availability of computers led to Usenet, developed in 1979, by graduate students at Duke University and the University of North Carolina. The network was created for greater access for the academic research

community. Usenet was a network that was separate from the ARPAnet and grew in popularity. By the early 1980s more of the general public began acquiring computers.

The Internet was essentially created between 1979 and the early 1980s when computer scientists created the TCP/IP transmission protocol. TCP/IP transmission protocol provided the solution of sending messages between all the different networks that were being created (Winston, 1998; Moschovitis, Poole, Schuyler, & Senft, 1999, p. 99). By 1986, The Cleveland Free-Net represented a turning point when online accessibility was made available to "anybody" who had a computer and a modem "regardless of income, education, or affiliation..."(Moschovitis, et al., 1999, pp. 99, 124-26). America Online was created in the late 1980s and targeted mainstream consumers for their Internet customers (Moschovitis, et al., 1999, p. 126).

A significant step in the evolution of computer communication was the formation of the World Wide Web in the early 1990s, and the browsers and the graphical user interfaces (GUIs) that followed shortly after. The Internet opened to commerce as people and corporations began to notice the increasing number of users. Early businesses like the *Yahoo!* search engine were realizing profits, not from the users of the search engine, but from advertisers and licensing agreements. Online Banking and shopping arrived in 1994. Soon after, web site creation was made available to all users and the power to distribute information extended from the large institutions down to the individual user.

As a result of its growth, the Internet medium did not escape without issues of regulation, such as private sector competition vs. monopolistic or government control, universal access/service vs. intellectual property protection, and privacy/security vs.

freedom of speech. Tensions existed between the users, the corporate world, and the federal government.

The Telecommunications Act of 1996, which purportedly broke the monopolistic holds of large corporations, stressed the concept of universal access, public safety or welfare, and the rights of consumers, and ensured telecommunications services were available to educational and health care institutions and public libraries at discounted rates. The Federal Communication Commission was to establish policies and standards for interconnection among the public and private networks. Yet since this act became law, the implementation of the law has been subject to heated debates on clarification, definitions, and access (Moschovitis, 1999, pp. 177-178; Teske and Kuljiev, 2000).

The Library Profession's Mission and Use of the Internet

The Library profession's mission of service continued into the late 20th century with the use of computer technology and the Internet. This profession was active in learning and applying computer and networking technology and continuing to turn their attention to the library users.

The American Library Association participated in the 1964 World's Fair by exhibiting and demonstrating an information retrieval from an online system that evolved from computer equipment used in the airline industry for making reservations. However, bibliographic data was entered instead of flight numbers (Bellardo, 1998, p. 119). Around this same time the library community began to invest resources to develop networks that share bibliographic data. The Ohio State Library Center (what would come to be known as the Online Computer Library Center, or OCLC) was created in which

libraries would pool their cataloging efforts into one large database, in order to streamline cataloging processes throughout all libraries (Forbes, 1995, pp. 148-149).

Libraries were the first to understand the need for networking retrieval standards with the development of the Z39.50 standard protocol—a protocol which provides access to documents across different computer systems. OCLC was the first to use this protocol, and later worked with NYSERNET to make this service available over the Internet (Forbes, 1995, p. 238). In 1987 Carnegie-Mellon University worked together with OCLC, Elsevier, and the IEEE to develop and install electronic library software at the university, and stimulate the market of electronic publishing. The Library of Congress also had the mission to digitize collections and make them available to the public across phone lines (Forbes, 1995, p. 458, 460).

In addition, the library profession was part of the discussion of the development of the proposed National Research and Education Network (NREN), and the National Information Infrastructure. This profession's primary concern was this new technology's affect on the public, and they worked to assure the Internet would provide equitable access and privacy to all citizens, and at the same time balance the need for intellectual property protection and fair use.

Summary

As radio became a significant communications medium between the late 1890s and the 1920s "there was uncertainty about radio's social role, its economic base and its ultimate destiny (Mander, 1984)." There existed a dichotomy of interest and thought about the new technology. While there was excitement about the invention, there was also uncertainty, and this was evident in the process of discussing the regulation of the

new medium. The politicians of the early 1900s tried to achieve a balance between "too much regulation...and the grasping selfishness of private monopoly" (Mander, 1984, p. 169). According to Mander (1984), the people of the early 1900s who worked closely to establish regulation of the medium used three models to approach the concept of regulation: transportation, public utility, and the newspaper press.

Those discussing regulation drew upon metaphors such as "control of traffic" and "rules of the road," much the same way people today speak of the information superhighway. They also debated the issue of the medium in terms of the public interest—specifically the individual listener, versus the individual who desired private gain through broadcasting. The decisions about the future of radio needed to include public concern and the public trust as there were fears about commercial monopolies. The argument of financing the radio medium, either via taxing the sale of the radio equipment or allowing advertising to pay for radio, was an economic and political one. Here discussions included equal access to the airwaves, freedom of speech, and again the power of monopolies (Mander, 1984, pp. 179-180).

As the Internet grew from the defense/academic research network to a mass medium of communication (Hargittai, 2000; Morris & Ogan, 1996), people responded to cues regarding issues of regulation. The library community also spent several years lobbying for benefits for libraries' mission of providing equitable access to information.

There are several parallels to the technological development, social use, and government regulation of both media that are not coincidental in terms of evolution of the mass communications systems they eventually became. The creators/inventors of these media perceived a need for a network of communication. Marconi, Fessenden, and

DeForest marketed their radio systems to governments and private industry. Also IBM worked to build their computer systems for the U.S. Navy and the airline industry. The government initially limited its involvement in the development of the media until the country's position in the political realm was considered inferior against a larger picture of potential domination. Roosevelt paid closer attention to the wireless technology when he realized that the U.S. Navy was lagging behind the rest of the world's navies. Eisenhower also realized that other countries were making progress in utilizing computer technology whose efforts were making the U.S. appear they were falling behind.

The library profession also perceived the new technologies as new tools for promoting their service and their mission. Libraries in the 1920s across the country utilized radio broadcasting to extend the reach of their programs such as book reviews, children's story hours, and talks on genealogy to the homes of the population they served. Library communities from the 1960s forward built and maintained computer networks to provide the reach of that same service and mission to those in remote places by providing access to the library's catalogs, databases, and eventually the Internet.

The government set a precedent with the telegraph in the late 1800s, that defined the regulatory model that would be used with the evolution of radio broadcasting and the computer networks that followed. As electricity moved information via the wire, the air, or electronically through a computer network, that model was comprised of minimal government involvement and greater holds by the private sector. Yet, tensions exist in society among all those who used the media. Everyone wanted a democratic system with no monopolistic or government control, or ownership. Yet, there are examples of issues of copyright, privacy, access, and freedom of speech.

These tensions are not a result of technological determinism, but the interplay of what technology brings to society, and how society in turn shapes that technology (Susman, 1984, p. 253; Douglas, 1987). Consequently, the discussion of regulation reveals society's thought, process, and action in determining the future of the media.

In fact, Douglas (1987) makes the point that radio was shaped by the cultural practices and ideas of its time. She analyzed how individuals, institutions, ideas, and the technology itself interacted to produce what ultimately became radio broadcasting by 1922 (p. xvi). McChesney (1996) takes a look at the Internet and compares discussion of political questions with those of the radio of the 1920s. He notes the similarities, mainly that the technologies were radically new, there was confusion as to who should control the technology, and discussion on the democratic potential of the media (p. 101).

Examining and comparing the discussion of regulation of the radio and Internet provided the opportunity to gauge change, or identify the similarities that persist in society's thought, process, and action. What emerged was the realization that similarities and differences exist among the issues and participants from both discussions, but more revealing, was a pattern of decision making (found throughout the legislation in both discussions) which focused on the subject of commerce.

Analysis of Radio Regulation Discussion

This chapter presents and analyzes the Executive and Legislative actions regarding the discussion of regulating what was known as wireless telegraphy, radio, and eventually radio broadcasting. The period covers 1904 to 1927, and represents, respectively, the time shortly after the wireless telegraph was demonstrated in the United States, and the year the Radio Act of 1927 established the laws for use after broadcasting appeared on the scene. A brief history of the time period, key participants, issues, and Executive and Legislative processes are presented to provide the picture of how each regulatory action resulted. A summary presents both the continuity and evolution of issues.

Brief Historical Context, 1900-1927

The time period in which radio was established in the United States is a period where, early on, large corporations such as oil, tobacco, steel, mining, and meat packing controlled the economy: Federal government regulation and social reform tried to keep the corporate world under control. Businesses consolidated and formed huge corporations to overcome the previous quarter century of an unstable market with wild economic fluctuations, severe depressions, labor unrest, and political turmoil. From 1901-1921, Theodore Roosevelt, William Taft, and Woodrow Wilson, in turn, instituted regulation to keep corporate power in check with anti-trust laws and government monitoring agencies such as the Interstate Commerce Commission, the Food and Drug Administration, and the Federal Trade Commission (An Era of Economic Instability, 1999; Curtis, 2001).

The Department of Commerce and Labor was established in 1903 during Roosevelt's administration, and comprised many bureaus associated with maritime transportation: Navigation, Fisheries, Steamboat Inspection Service, Coast and Geodetic Survey, Immigration, and the Light House Board. However, this department also had bureaus presiding over many other aspects of commerce such as Corporations, Manufacturing, Statistics, Standards, and Census (Bowers, 1995, p. 7-9). Later in 1913, Taft signed legislation that split Commerce and Labor into two separate departments (Bowers, 1995, p. 11).

New sources of power, such as electricity were harnessed during this time. Messages moved through systems such as the wired telegraph and the telephone, and transportation moved goods and people across networks of roads, railroads, and shipping. The United States developed regional, national, and international markets that bound the country together, but instability in the economy continued through 1920. As industries expanded, the economy was countered by downturns. While World War I boosted the economy, overproduction at the war's end in turn weakened it (Douglas, 1987; An Era of Economic Instability, 1999; Curtis, 2001). Eventually this progress spawned and promoted the newer method of the wireless telegraph, where messages moved through the air without the aid of any wires.

Marconi publicly demonstrated the wireless telegraph in the United States at the America's Cup races in 1899, and radio interests and activities began to increase rapidly (Douglas, 1987, p. xvi, chap. 3, chap. 5). Commercial rivalry, squabbling, and stock selling scandals existed between wireless companies, as well as the suits in courts involving patent infringement on wireless equipment. During the first two decades of the

1900s the use of radio was primarily for maritime activity—both military and commercial. Three departments of the federal government (Department of Agriculture, Department of War, and the Department of the Navy) were also building and expanding their wireless telegraph stations without coordination among themselves and competing for control (Howeth, 1963, chap. 7). In addition to the commercial wireless companies and the federal government, the amateur wireless operators, a subculture of middle-class American men and boys who became the forerunners of the ham radio operators, also struggled to maintain a place in the airwaves. These amateur operators became masters at building their own wireless transmitting and receiving sets between 1906 and 1912 (Douglas, 1987, chap. 6).

Four years after Marconi's demonstration in 1899, representatives from Great Britain, France, Spain, Austria, Russia, Italy, and the United States met in Berlin in 1903 at the first International Wireless Telegraph Conference to address issues resulting from the increasing use of this technology such as international monopoly, regulation, and each country's territorial airspace (Douglas, 1987, p. 120). However, laws in the United States were enacted that, initially, only licensed the commercial and amateur stations without regulating the industry. Later, the law established dominance in the airspace for the military, first, and the commercial players next. Commercial companies and the amateurs operators were required to be licensed while the federal government stations were organized under the direction of the Navy by Executive Order.

Morse Code was transmitted over wireless telegraphy. The term *radio* replaced the term *wireless* around 1911 when J. Howard Dellinger, of the Department of Commerce's Bureau of Standards, reviewed proposed legislation and suggested the term

radio better reflected the radiating nature of the medium. A year later, in 1912, a Senate report changed *radio telegraphy* to *radio communication* in anticipation of commercial development of radio telephony, then only in an experimental stage (Bensman, 2000, pp. 7, 9).

When the United States entered World War I in 1917, Woodrow Wilson invoked a section of the Radio Act of 1912 and issued a presidential proclamation to take control of all commercial, as well as amateur radio stations during wartime. All commercial stations were turned over to the control of the Navy and the amateur operators were ordered to dismantle their equipment. However, the Navy later campaigned to enlist amateur operators during the war, thereby significantly increasing the number of the Navy's radiomen (Douglas, 1987, pp. 297-298).

Howeth (1963) noted that there were approximately 75 commercial wireless telegraph stations either constructed, under construction, or in the planning stages in 1903. The Navy had 20 shore stations with plans to increase that number by 1904. One hundred and twenty-two amateur wireless clubs existed in the U.S. in 1912, holding their meetings over the airwaves on a pre-arranged wavelength. Their numbers increased dramatically from 322 individual amateurs licensed in 1913 to 10,279 licensed in 1916. Only 5,202 commercial stations were licensed during the same period (Douglas, 1987, pp. 205, 293, 297-298).

Economic prosperity returned around 1922 and continued until the stock market crash of 1929. This era was known as the *Age of Big Business*. Rural populations declined while urban populations grew. Several industries grew during this time: automobile, electric power, machinery, radio, aviation, and motion pictures. However,

increases in workers' income did not keep up with increases in corporate profits. Republicans dominated the federal government during this time under Warren G. Harding and Calvin Coolidge, and the Administrations' goal was to foster competition. These two presidents believed the government's role was to "protect and to work with private organizations, lending governmental support to business and industry development" (Benjamin, 1998). Eventually businesses used government regulation to "impose order on their industries and weed out the smaller competitors" (Curtis, 2001; The Prosperity Decade, 1999).

Broadcasting entered the scene in the 1920s. People were amazed to hear the human voice, and wondered how radio would change America. However, in addition to the federal government, commercial radio companies, and the amateurs, institutions such as universities, churches, newspapers, power companies, and department stores built their own radio stations. The number of broadcasting stations increased from 23 stations in December of 1921 to 570 in December 1922. Interference increased with the growing number of broadcasting stations. The problem was that directing messages via radio, whether telegraphically or telephonically, was uncontrollable. No technological method existed that would isolate a transmission to only the sender and the receiver. As growth in the number of broadcasting stations occurred, there was a corresponding increase in the number of overlapping signals.

Although Herbert Hoover served as President of the United States from 1929 to 1933, he first took office as Secretary of Commerce in 1921, and worked to fit broadcasting into the spectrum by working with government departments, the commercial companies, and many others to reach a solution to the interference problem.

That solution ultimately proved to be the creation of a regulation that declared the airwaves a public owned resource that would serve the public interest, but would have its very framework established in the earliest regulatory efforts in 1904 (Bensman, 2000, pp. 30; Douglas, 1987, pp. 303, 315).

Radio Regulation

The formative years of radio regulation are represented by four actions, the first executive, and the last three legislative that are marked by the years 1904, 1910, 1912, and 1927. Morse Code was transmitted via wireless telegraphy between the actions of 1904 and 1912. The wireless telegraphic activities of both privately owned wireless telegraph companies and the federal government were tied largely to maritime transportation, and, consequently, so was the discussion of regulation. Three groups fought for access to the wireless spectrum for transmission purposes during this time: privately owned or commercial wireless companies, the federal government, and the amateur operators (Douglas, 1987, p.219). Wireless telephony was demonstrated around 1908, 1909, and 1915, but was not pervasive since broadcasting as a concept did not arrive until the early 1920s. By 1927, those from the commercial radio industry (i.e., AT&T, GE, and Westinghouse), the federal government, the amateurs, and many others entered the discussion of how radio would be used.

The federal government, commercial wireless companies, and the amateurs had much to gain from this new technology, and continued as key players in policy discussions during the first quarter of the 20th century. Over time, they created and modified key arguments as a result of historical events, international and national conferences, legislation, and court cases. As the technology improved, their arguments

also evolved, increasing in complexity and focus. Policies born of a concern for marine uses of telegraph—public safety as it pertained to ships at sea—came increasingly to address a more broadly conceived approach to policy issues and the public welfare including monopoly, private property, equity of access, governmental power, and ultimately, freedom of speech. This chapter documents the discussion as it emerged in the opening decades of the 20th century. Tables A1 and A2 in Appendix A outline the bills that specifically addressed regulation of commercial and amateur stations between 1904 and 1927, as well as the key participants in the discussion of regulation.

1904-Roosevelt's Interdepartmental Board of Wireless Telegraphy

The year 1904 represents the federal government's first formal efforts to discuss the regulation of wireless telegraphy (Bensman, 2000, p. 4). President Theodore Roosevelt then formed the Interdepartmental Board of Wireless Telegraphy (known as the Roosevelt Board) in June 1904. Roosevelt's purpose was to end the struggles between different federal government departments using wireless telegraphy, combine these activities under only one government department, determine how private, or commercial, wireless stations and federal government wireless stations could coexist, and determine the specific conditions in which the government could control the airwaves of the wireless technology. As part of the discussion of these issues, the board was to take into consideration the rights of the inventors in the entire process (Douglas, 1987, p. 124).

Executive Order

The Board's final recommendations, briefly stated, placed the control of coastal wireless communications under the Department of the Navy (herein afterwards referred

to as "The Navy"). The Navy would provide wireless communications for all the U.S. coasts and insular possessions, as well as the canal zone in Panama, and would receive and transmit wireless messages to and from ships at sea when not in competition with commercial wireless stations. The Army would be authorized to build wireless stations as necessary, provided they do not interfere with the coastal wireless system under the control of the Navy. The Weather Bureau, under the Department of Agriculture, would give up their entire wireless system to the Navy, as the Navy planned to collect and transmit the meteorological data the Weather Bureau needed. Finally, the board also expressed the need for the federal government to provide legislation to regulate private or commercial stations under the Department of Commerce and Labor.

The Board's primary reason for recommending legislation was concerned with preventing the control of commercial wireless stations by monopolies, or trusts, for the commercial companies mutual welfare and public welfare (Howeth, 1963, appendix C). However, the Board stipulated a caveat that even though these stations would be under the supervision of the Department of Commerce and Labor, they could not be allowed to locate near the Navy's coastal wireless system without approval by the Navy because of anticipated interference and matters of national defense (Howeth, 1963, appendix C).

President Roosevelt approved the recommendation of the Roosevelt Board, by Executive Order, on July 29, 1904, and the coastal federal government wireless stations were placed under naval control. Following this report, the Navy submitted a draft for legislation of commercial wireless to the Department of Commerce and Labor for review (Howeth, 1963, chap. 7). Unfortunately, according to Howeth (1963), this proposed

legislation never made it to Congress, as a result of commercial interests' opposition, as well as the postponement of the next International Wireless Telegraph Conference.

Key Participants

The key participants in this discussion were representatives solely from the federal government, and largely from the military, which included representatives from the Department of the Navy, the Department of Commerce and Labor, the War Department, and the Department of Agriculture (Douglas, 1987, p. 124, Howeth, 1963, chap. 7). Later, representatives from commercial wireless companies such as American Marconi, National Electric Signaling Co., Fessenden, as well as DeForest, provided input regarding proposed legislation, but only after the Roosevelt Board announced their final recommendations (Howeth, 1963, chap. 7).

Steps Leading to the Executive Order of 1904

Internal Correspondence

The events of 1904 were preceded by a discussion which began in early 1902, with internal correspondence in the Navy. The Navy's Bureau of Equipment was responsible for "assessing and acquiring wireless telegraphy" (Douglas, 1987, p. 109), and Admiral R.B. Bradford, Chief of the Bureau of Equipment, wrote to the Secretary of the Navy expressing concern over the interference from the growing number of commercial and amateur stations. Bradford expressed his belief that all wireless stations should be regulated by the federal government in some way. He feared that private stations would soon monopolize these locations, and, consequently, it would be difficult to revoke the rights and privileges then extended when the Navy needed them in the name of national defense (Howeth, 1963, chap. 7). In addition, the Navy also did not

view other federal government departments with wireless systems as being capable, nor prepared, to control all stations.

The process continued with U.S. delegates participating in the International Wireless Telegraph Conference in Berlin in 1903. Three individuals represented the United States: John I. Waterbury, Department of Commerce and Labor; Brig. General A.W. Greely, U.S. Signal Corps, USA; and Commander Francis M. Barber, USN retired. The subject of the conference dealt with monopoly of wireless transmissions, and consequently sought international cooperation for intercommunication, or unconditional communication among differently manufactured wireless systems (Howeth, 1963, chap. 7).

While the United States' participation in the international conference was being contemplated, the Secretary of State requested the opinion of the U.S. Attorney General on legal suggestions for any proposed regulations for the conference. Consequently, the U.S. delegates for the conference were informed of this opinion (Howeth, 1963, chap. 7). The U.S. Attorney General clearly stated that the United States has the power to impose conditions on "the operation of any wireless telegraph system which conveys messages to and from the United States" (Zollman, 1930, p. 269). The U.S. Supreme Court defined such transmission as commerce, foreign or interstate, and indicated that commerce fell within the power of the federal government to regulate (through the U.S. Constitution's Commerce Clause, Article 1, Section 8). The Attorney General went on the clarify that the power to regulate is not based "upon the means employed" (i.e., telegraph wires, submarine cables, or any wireless system), "but upon the end attained" (Zollman, 1930, p. 269).

The International Wireless Telegraph Conference's final resolution agreed to intercommunication among wireless coast stations regardless of the type of system employed by ships. However, there was no "force of law" behind this resolution (Douglas, 1987, p. 122). The U.S. delegation realized that other governments were developing wireless and placing it under government control, and conceded the United States had done little to establish control over its own wireless situation (Douglas, 1987, pp. 122-123). However, the United States took no legislative action regarding the international conference resolution, as Congress did not consider such legislation pressing. Over the next few years, Congress was sympathetic to American wireless manufacturers' opinions that such regulation would stifle development and place control in international hands (Bensman, 2000, p. 6; Douglas, 1987, p. 216).

Regardless, the Navy continued its internal correspondence on the subject of regulation in early 1904. Rear Admiral George A. Converse, then new chief of the Bureau of Equipment, wrote to the Secretary of the Navy to advocate naval control of all wireless stations along the coast. Converse identified the principle defect of wireless technology as interference from other stations, owing to the close geographical location, and eventually power of the stations themselves. He did not perceive any change of this use of wireless in maritime communications, and concluded that the Navy was the most logical department for controlling all federal government stations on or near the coasts. Converse also pointed out that although the federal government could control all wireless telegraphy in times of war through martial law, legislation was needed to control the interference in times of peace (Howeth, 1963, chap. 7).

In 1904, the issue of regulation came to the attention of President Roosevelt's cabinet by events during the Russo-Japanese war. Both parties engaged in this conflict used wireless telegraphy. Some U.S. commercial wireless companies were also present, and relayed information to the London Times and New York Times newspapers as the events of the war unfolded. Russia, however, was opposed to neutrals using wireless in this war, and made their complaints known to the U.S. Douglas (1987) makes the point that at this time questions were raised concerning priority in the airwaves [commercial companies vs. federal government] and protecting these government wireless stations from interference by commercial stations (p. 122-123). Unfortunately, no guidelines for using wireless in times of peace or war had been previously established. The President's cabinet met to discuss the issue of regulation in light of this incident, and agreed that the federal government should have "general supervisory control" over wireless operations in peacetime and complete control in time of war (Howeth, 1963, chap. 7).

In light of this wartime activity, the discussion now turned on which agency or agencies within the federal government should have responsibility for regulating wireless stations. Arguments persisted as to what regulation might mean in times of peace as well as times of war. What followed was correspondence from the Secretaries of Agriculture, War, and the Navy to the President. The Department of Agriculture advocated controlling the coastal wireless stations, and the Department of War advocated record-keeping in peacetime, and complete control in wartime.

The General Navy Board sent a memo to the President explaining that the principal defect, or liability, of wireless technology was the interference. For reasons of national security in times of peace or war, this Board believed it was important to place

control of all the federal government wireless stations on the seacoast under the control of one department, primarily the Navy. In addition, the Board, made a point of stating that they did not believe it wise for the federal government, or the military, to control all seacoast wireless business of the country (Howeth, 1963, chap. 7). Therefore, legislation of private, or commercial, wireless stations was necessary to prevent interference with federal government stations. They suggested the Department of Commerce and Labor as the most natural government department to control private, or commercial wireless stations. This choice seemed logical as the Department of Commerce and Labor had, among its many charges, the duty to inspect and license steamships for protecting life and property (Bowers, 1995, p. 9).

President Roosevelt consequently formed the Interdepartmental Board of Wireless Telegraphy (the Roosevelt Board) in June 1904, as mentioned above. Not surprisingly, the issues, conclusions, and recommendations that resulted from the discussions of the Roosevelt Board were the same issues, conclusions, and recommendations that the General Navy Board put forward to the President in April 1904. The Navy wanted control of all federal government wireless stations, as well as approval authority over the location of commercial stations, and did not see the use for wireless telegraphy moving much beyond the association with the ocean (i.e., between ships, and between ship and shore). Despite the push for legislative control of private or commercial stations, naval representatives informed the press that there was no intention to create a federal government wireless monopoly (Douglas, 1987, pp. 124-125).

Public Reaction

However, the press was not convinced. At the time the Roosevelt Board was formed, the *New York Times* indicated that this effort on the part of the federal government raised new questions including the issue of monopoly of the airwaves, personal and property rights, and rights of the inventors (Rivalry for Control, 1904). The Roosevelt Board submitted their conclusions and recommendations to the President, and the *New York Times* "described the plan as nothing less than confiscation" (Douglas 1987, p. 125). The *New York Tribune* and the electrical engineering trade journal *Electrical World* also did not view federal government control favorably, and condemned the policy as authoritative and bureaucratic (Douglas, 1987, pp. 125-126). NESCO, Reginald Fessenden's wireless company, additionally labeled these recommendations as "a socialistic scheme for stealing property"(quoted in Douglas, 1987, p. 126).

Soon after President Roosevelt approved the recommendation of the Roosevelt Board, the Navy submitted a draft for legislation of commercial wireless to the Department of Commerce and Labor for review. The draft immediately was forwarded to a committee who would not only review the recommendations of the Roosevelt Board, but also the U.S. position regarding the drafted protocol from the 1903 International Wireless Telegraph Conference. This committee, composed of personnel from the Department of Commerce and Labor and the Navy, held meetings with representatives from commercial wireless companies. Some companies strongly opposed the recommendations of the Roosevelt Board, while others saw benefit for both federal government and private or commercial interests (Howeth, 1963, chap. 7).

This committee drafted its own version for the proposed legislation. They defined wireless telegraphy as "any system of electrical communication by telegraphy without the aid of any wire connecting the points from, and to which, the messages, signals or other communications are sent or received" (Howeth, 1963, appendix D). The legislation required that all persons or corporations operating wireless telegraphs be licensed, and fined if they were not. Licensed persons, or corporations, would also be fined and/or imprisoned if they willfully or maliciously interfered with other wireless transmissions (i.e., with the federal government, military, or other private or commercial companies).

In addition, it was the duty of every person or corporation operating wireless telegraphs to receive all messages without discrimination, or regard, to the manufacture of the wireless telegraph system, and provide their service at a price practiced in the market. (Howeth, 1963, appendix D). The legislation also prohibited federal wireless stations from competing with private stations. Finally, the committee proposed that the Secretary of Commerce and Labor would have the power to set terms, conditions, and restrictions governing the issuance of licenses, and the power to enforce such regulations.

In like manner, the President of the United States would be empowered to regulate all privately owned stations to prevent the possibility of interference with those run by the Army, Navy, or other governmental agency. In times of war or public peril the President would assume direct control over all wireless stations. Finally, the legislation initiated a class system for licenses, with first class licenses issued to fixed stations and second class licenses reserved for ships. Experimental stations (stations

engaged in scientific study of wireless technology) would also be licensed but without a fee (Howeth, 1963, appendix D).

Key Issues

Interference was viewed as the principal defect of wireless technology, and the Navy wanted to secure the desirable geographical locations along the coast, and prevent private or commercial interests (as well as other federal government stations, i.e., Weather Bureau from the Department of Agriculture) from acquiring rights to those locations. The Navy defined interference by more than one factor. Interference constituted the nearness of stations with sufficient power as to obstruct transmissions of others, as well as malicious or unintentional interference on the part of operators. The commercial companies perceived interference as a defect that would soon be overcome through further development of the science, and they also viewed property rights as infringement on the part of the federal government on the patents of their inventions.

Monopoly was perceived as a problem from both the federal government as well as the commercial companies. The Navy feared control of wireless transmissions by such companies as the Marconi Company, who worked to build a monopoly by controlling the flow of transmissions sent or received through only a "Marconi Company" equipped network, thereby refusing to comply with intercommunication. Controlling these monopolistic tendencies consisted of discussion requiring intercommunication, as well as supervision of private and commercial stations through licensing by the Department of Commerce and Labor. The Navy pressed the issue that licensing would protect the welfare of the stations as well as the public (Howeth, 1963, appendix C).

However, the commercial companies did not perceive licensing as any safeguard; they perceived licensing as a matter of control. No law for commercial and private companies resulted from the efforts of the Roosevelt Board's conclusions in 1904 and the drafted legislation in 1905. The objections from the growing wireless industry prevented any legislation being proposed to Congress. Only the federal government stations were under federal government control, then established by Executive Order. No regulation was to exist for commercial and private companies at this time.

The Wireless Ship Act of 1910

Legislation

The Wireless Ship Act of 1910 (1911), enacted on June 24, 1910, represents the first piece of legislation that attempted to regulate wireless technology in the United States. This Act required that any ocean going vessel carrying 50 passengers or more be equipped with wireless telegraphic equipment, considered efficient and in good working order, that could transmit messages over a distance of at least one hundred miles (Sec. 1). In addition, the vessel must have an individual skilled in the equipment's operation (Sec. 1).

The issue of intercommunication was addressed by declaring the equipment "efficient," only if the company installing the equipment agreed, by contract, to exchange messages with other types of radio communication systems (Sec. 2). Any violation of these provisions were subject to fines (Sec. 3), and the Secretary of Commerce and Labor had the power only to execute the provisions of this Act by use of customs collectors or other officers of the federal government (Sec. 4). This Act was effective July 1, 1911, and amended on July 23, 1912 to require auxiliary power supplies, have at least two

skilled operators, and require at least one operator be on duty "at all times the ship was moving" (Douglas, 1987, p. 220; Howeth, 1963; Wireless Ship Act, 1911).

Key Participants

The key participants in this discussion were, not surprisingly, the federal government and the military, primarily the Navy and the Department of Commerce and Labor, but also the President of the United States. Continuity of this discussion resulted from the repeat participation of Rear Admiral Henry M. Manney, USN, John I. Waterbury, Department of Commerce, and Commander Francis M. Barber, USN retired. Waterbury and Barber had represented the U.S. in the first International Wireless Telegraph Conference in 1903, and Manney was the individual that drafted the first piece of proposed legislation in 1905 that was drawn from the Roosevelt Board's 1904 recommendations but was never submitted to Congress (Howeth, 1963, chap. 10).

Drafted legislation finally made it to Congress and congressional committees were now involved. Many bills were referred to various committees such as the House Committee on Merchant Marine and Fisheries, the Senate Committee on Commerce, the House Committee on Interstate and Foreign Commerce, the Committee on Naval Affairs, the Committee on the Judiciary, and the Committee on Foreign Relations. (42 Cong., Rec. Index 60th Congress, 1st Sess., 1909; 43 Cong., Rec. Index 60th Congress, 2d Sess., 1909; 45 Cong., Rec. Index, 61st Congress, 2d Sess., 1910).

The participants of these hearings consisted of representatives from commercial wireless, telephone, steamship companies, scientists respected in the area of wireless telegraphy, and the amateur wireless clubs. Many of the company representatives consisted of company presidents and vice-presidents, as well as attorneys. In addition to

the military and federal government individuals listed above, the federal government was also represented at these hearings by such departments as the Bureau of Navigation and Steamboat Inspection Service (both under the Department of Commerce and Labor), the Revenue Cutter Service, the Navy's Equipment Bureau, as well as the Army Signal Corps. Many of these representatives were repeat attendees at these hearings (Wireless Telegraphy and Wireless Telephony, 1910, February 16; Radio-Telegraphic Installations, 1910, February 3, 5, 6; Wireless Telegraphy, 1910, February 9, 10; S. Rep. No. 2086, 1909, February 9; To Regulate Radio Communication, 1910, April 28).

Steps Leading to the Wireless Ship Act of 1910

Years following the Roosevelt Board Recommendations

In the years following the recommendations of the Roosevelt Board, and preceding the passage of the Wireless Ship Act of 1910, several bills were proposed to Congress requesting regulation of wireless telegraphy. The description of regulation was primarily associated with the safety of ships and lives at sea (Rosen, 1975, p. 1; Douglas, 1987, p. 219). All of these bills required ships to install wireless equipment and employ a skilled operator. Some required licensing commercial wireless companies and operators, and penalized such for interference to federal government and military wireless stations, as well as interference with distress calls. Other bills required that messages be sent and received regardless of the wireless system's manufacturer, (Douglas, 1987, p. 219; Howeth, 1963, chap. 10; 42 Cong., Rec. 60th Cong., 1st Sess., 1908, pp. 2959, 2322, 3114).

Adding to the pressure of Congress, was a push for ratification of the treaty from the second International Wireless Telegraph Conference in 1906 in which 27 countries

participated. These participants included not only the countries who participated in the conference from 1903, but also Argentina, Hungary, Japan, Mexico, Norway, and Turkey, to name only a few (Douglas, 1987, p.138; International Wireless Telegraph Convention, 1907). At this conference the United States pushed for intercommunications between ship and shore, as well as between ships themselves.

Congressional hearings were held. Some companies were opposed and some supported the idea of regulation (Howeth, 1963, chap. 10). Notably, John I. Waterbury, of the Department of Commerce, submitted written testimony to a Senate Committee in support of this treaty's ratification. Waterbury saw the inevitability of international action regarding the provisions of intercommunication, control of interference, and service to the general public. He also saw problems with the absence of regulations, emphasizing that rapid expansion and use of the airwaves as a public highway for radio communications resulted in confusion (Howeth, 1963, chap. 10).

Still, Congress refused to ratify the provisions of this second conference, and failed to pass the many bills submitted for regulation of wireless telegraphy before 1910. Other legislative issues under the headings of antitrust, child labor, food and drug act, as well as severe objection from the U.S. wireless companies, proved too great a preoccupation to include discussion on wireless regulation (Douglas, 1987, p. 216; Howeth, 1963, chap. 10).

Public Opinion

Howeth (1963) notes that, shortly before 1910, public opinion toward regulation began to change in favor of the federal government's perspective. He notes that the trade journal *Electrical World,* as well as *Scientific American,* began to shift their perspective

toward the topic of regulating wireless telegraphy. Editorials from these two journals noted the primary use of wireless telegraphy as being maritime communications, and that all ocean-going vessels should be required to have wireless equipment aboard. Furthermore, they also emphasized the problem of interference with federal government business by the amateurs.

Electrical World especially noted that they also did not foresee private wireless companies attempting any form of self-regulation (Howeth, 1963, chap. 12). President Roosevelt sent a memorandum to Congress urging the passage of legislation requiring ships to be equipped with wireless technology (Howeth, 1963; H.R. Rep. No. 2086, 1909, appendix G). Other examples that swayed public opinion toward regulation were the events Douglas refers to as "successes and failures at sea" (Douglas, 1987, p. 219). Successful examples were collision of ships at sea in which skilled operators, using wireless telegraph equipment, transmitted calls for help in time to save lives. Alternately, there were examples of wireless operators providing false information regarding navigation, as well as, refusing to stop interfering with a distress call in progress. (H. R. Rep. No. 892, 1910, March 29).

Although Howeth notes that public opinion was beginning to change, it was still not without opposition to the many bills submitted to Congress during this time period leading up to 1910. Those bills that advocated any form of legislative control of private or commercial wireless companies were still opposed by the editors of the *Electrical World*, and *Scientific American,* the commercial wireless companies, as well as the amateurs (Douglas, 1987, p. 223-224; Howeth, 1963, chap. 10, 12). Congressional hearings, between 1908 and 1910, revealed the commercial wireless companies' and

amateurs' opposition to those scenarios that would provide power to the President or the Secretary of Commerce and Labor to establish operating wavelengths, issue or revoke licenses for any wireless operation, commercial or amateur. The commercial companies and the amateurs believed such power as excessive and czar-like (Douglas, 1987, p. 223; H.R. Rep. No. 924, 1910, April 1).

Congressional Action

Congressman Ernest W. Roberts of Massachusetts submitted the only bill that drew a greater amount of support from most of the three groups competing for access to the airwaves (military, commercial, and amateur). Some commercial wireless companies supported this bill, some were opposed. Roberts introduced a joint resolution, in December of 1909 that proposed the creation of a board composed of three representatives from federal government, three representatives from commercial wireless companies, and one scientist knowledgeable about wireless technology. This board would devise a plan to govern all radio stations in the United States "with due regard for all." (Douglas, 1987, p. 225; Howeth, 1963, chap 12; Wireless Telegraphy & Telephony, 1910, February 16).

Roberts opened the congressional hearings by discussing the subject of property rights in the airwaves. He informed his audience that civilization was entering new legal territory regarding wireless communication and that change needed to occur in the age-old concept that the "air was absolutely free to everyone" (quoted in Howeth, 1963, chap. 12). However, Roberts' stated intention was not to prevent use to any one group, but merely to control the use so as to prevent interference and protect the public welfare. Consequently, he visualized everyone having access to the airwaves, but in a controlled

fashion so "that all will have their rights" (quoted in Howeth, 1963, chap. 12). Roberts' resolution was reported to Congress in March of 1910, but the proposed legislation never made it to Congress for debate or vote (H. R. Rep. No. 892, 1910, March 29).

Although a number of bills were introduced in Congress during this period, only three bills made it to the Congressional floor for debate: H. R. 27672 (1909), S. 7021 (1910), and S. 7243 (1910). These bills turned on the issue of monopolies. House bill H.R. 27672 was debated on the floor February 16, 1909 with the main focus of discussion centered upon the issue of monopoly. As steamship companies would be required by law to install wireless telegraph equipment (if they had not already done so) Congress was concerned with any one commercial company instituting a monopoly or price fixing on the selling of equipment, as well as charging exorbitant prices for sending messages.

Penalties would result if steamship companies did not comply with the requirement for equipment installation, and some in Congress perceived this as a possible hardship, or unfair business practice. Further debate seemed to assure the majority of the House that several companies existed from which to purchase equipment, and that this bill required no specific wireless system, the issue of monopoly was no greater than it was for any other business, and would be covered by existing anti-trust laws. Therefore, no special provisions were needed to address the issue of monopoly.

The only hint at regulation came from one congressman who noted that a previous version of the bill included powers for the Secretary of Commerce and Labor "to remit or mitigate penalty" regarding the bill's provisions, and described this as vicious. He further noted that any such provision not be included in any future bill associated with

navigation. The bill passed the House and was referred to the Senate Committee on Commerce. Unfortunately, Congress took no action before its session ended (43 Cong., Rec. 60th Cong., 2d Sess., 1909, pp. 2495-2501).

Senate Bill S. 7021 eventually passed into law as the Wireless Ship Act of 1910 (1911). Introduced on March 22, it was delayed for any discussion until May 4, 1910. Even then, the discussion on the congressional floor was minimal. The only concern was whether the bill specifically regulated wireless telegraphy. This concern was clearly answered with a resounding "No." The main point of the bill was described distinctly as being in the interest of saving human life, and was referred to the House Committee on Merchant Marine and Fisheries. It was reported favorably, and passed on June 20, 1910, becoming Public Law 262 on June 24th (43 Cong., Rec. 60th Cong., 2d Sess., 1910, p. 8858-8859).

The third bill that reached the congressional floor was S. 7243. This bill was debated and passed by the Senate on June 16, 1910, also with minimal discussion, and was referred to the House Committee on Merchant Marine and Fisheries on June 17, 1910 (45 Cong., Rec. 61st Cong., 2d Sess., 1910, p. 8222). The bill addressed the issue of licensing wireless operators, establishing classes of licenses, and penalizing those who knowingly interfered with transmissions of naval or any military stations and with transmissions of distress. The President of the U.S. would have the power to assign wavelengths for purposes of preventing interference, and the bill placed the administration of the bill's provisions under the Department of Commerce and Labor.

Senate Report No. 659 (1910, May 6, pp. 1-6) described the purpose of the bill as the preservation of life at sea, with the object of the legislation being for the benefit of the

public interest. The key point this report made was that the wireless telegraphy's usefulness, and its potential would be hampered by the unrestricted use by corporations and irresponsible persons. The report also cited several instances in which the Navy was subject to interference. Unfortunately, Congress never acted upon S. 7243 before S. 7021 was passed into law as the Wireless Ship Act of 1910.

Results of Legislation

The Wireless Ship Act of 1910 contained no regulation of commercial wireless companies or amateur wireless operators. With the exception of stipulating the exchange of messages with other systems (intercommunication), the Wireless Ship Act of 1910 did not include the issues previously addressed by the Navy. The Act did not address interference, nor the issues of monopoly (either on the part of the federal government, or private wireless companies). And although the Department of Commerce and Labor was in charge of the execution of this act, there was no stipulation of supervising the commercial or private stations that the Navy so fervently wanted. According to Douglas "the law exacerbated interference" (Douglas, 1987, p. 220). More ships needed to be equipped which consequently would increase the number of wireless transmission activity, thereby increasing interference.

In part, Congressional hesitation arose from the realization that wireless technologies were still developing, and a fear that regulating a science so new might well stymie that development (Douglas, 1987, p. 217; 43 Cong., Rec. 60th Cong., 2d Sess., 1909, p. 2497). The wireless scientists, engineers, and inventors advanced this perspective, and tried to discourage regulation of their industry by insisting that further development would soon control, if not eliminate, the problems of interference (Howeth,

1963, chap. 10). Although some of the House and Senate reports mentioned the issue of monopoly, their discussion encouraged Congress not to be concerned because this was either already addressed by existing law, or that it was not an issue (H. R. Rep. No. 2086, 1909, February 9).

Key Issues

The key issues of discussion that led to the Wireless Ship Act of 1910 carried over from the 1904 recommendations of the Roosevelt Board as well as the discussions surrounding the International Wireless Telegraph Conferences. These issues were interference, intercommunication, control of commercial and amateur wireless telegraphy by the Department of Commerce and Labor, monopoly, property rights, and public welfare. Every issue was tied to the problem of interference. Intercommunication was tied to ship safety and safety of lives at sea. It was critical for all wireless operators to send/receive transmission without regard to the equipment manufacture-especially for distress calls. Licensing and supervision of private and commercial companies and operators through the Department of Commerce and Labor would prevent interference to military and federal government stations.

The question of monopoly was viewed on one hand as a possibility of unfair business practice or price fixing since discussion of legislation required all ships carrying 50 or more passengers to be equipped with wireless telegraphy. On the other hand, some perceived the issue of monopoly required no special provision as business practices of commercial wireless companies would be covered by existing anti-trust laws.

The issue of property rights acquired additional meaning. In addition to patents, the discussion turned to providing access to an invisible resource that was considered free

to all the users of the air. As Congressman Roberts described, the area of discussion was new legal territory. The concept of the air being free to everyone needed to be re-examined and changed to control use in order to prevent interference (Douglas, 1987, p. 217-218; Wireless Telegraphy & Wireless Telephony, 1910, February 16, p. 3). Public welfare became clearly defined as the safety of property and lives at sea.

The Radio Act of 1912

Legislation

The Radio Act of 1912 (1913) represents the first legislation that finally regulated for interference, intercommunication, and placed the commercial and private stations under the control of licensing by the Department of Commerce and Labor. The Act comprised 11 sections with 19 regulations governing the use of the airwaves, and various penalties existed for violating the provisions of the Act with fines, imprisonment, or both. The cost of the fines ranged from $25.00 to $500.00. The law was not applicable to the Philippine Islands and would take effect four months after its passing on December 13, 1912 (Kahn, 1984, pp. 14-22).

This act defined radio communications (Radio Act of 1912, 1913) as "any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received" (Sec. 6). The act required intercommunication between any wireless system, and made it mandatory that any person, company, or corporation (except the federal government) shall not use any radio apparatus for commercial intercourse without a license (Sec. 1). These licenses were issued upon application and only to citizens of the U.S., or companies incorporated under the laws of

the U.S., by the Department of Commerce and Labor (Sec. 1). No one could operate the radio equipment on a foreign vessel unless under the law and regulations specified in this Act (Sec. 8). Malicious interference and the sending false messages on the part of any radio operator was not tolerated (Sec. 4). The President had the power, in time of war or public disaster, to take control of any station or equipment with compensation to the owners (Sec. 2).

The Secretary of Commerce and Labor determined the license form and restrictions, and had the ability to revoke any license for cause (Sec. 2). Each license specified the stations' ownership, location, purpose, authorized wave lengths, operating hours, and was subject to the regulations stated within the act or any future regulations established by subsequent Acts or treaties of the U.S. (Sec. 2)

The nineteen regulations that fell under Section Four required each station to designate a wavelength as their normal sending and receiving wavelength as long as these wavelengths fell into the range of less than 600 meters or greater than 1,000 meters. Each station had the opportunity to send/receive on other wavelengths, but were still required to stay within the boundaries of less than 600 meters or more than 1,000 meters, as well as adhere to specific technical wave requirements. All stations were required to use the minimum amount of energy for sending and receiving messages. However, each station aboard ship needed to have sufficient power to send and receive distress calls over a distance of 100 nautical miles (Sec. 4).

Distress calls were sent and received on the wavelength designated by the 1906 International Wireless Telegraph Conference (300 meters), was specified as the Morse code SOS signal, and had priority over any other transmissions. If interference

originated on the part of a distress call, the interference would be permitted, and each station had the duty to listen at the 300 meter wavelength at periodic intervals for such distress calls (Sec. 4)

There were also regulations regarding geographical location to Navy or military stations. Ships within 15 nautical miles of a naval or military station needed to reduce their station's power capability unless sending distress signals. To prevent interference between military and commercial stations in close proximity, commercial stations would not transmit messages during the first 15 minutes of each hour in order that the Navy would be able to send and receive their transmissions. Stations that were not engaged in commercial activities and located within five nautical miles of a naval or military stations were required to transmit below the 200 meter wavelength. Finally, no future stations were allowed to be constructed within 15 nautical miles of specified naval or military installations. The government would handle the commercial communications in these instances at rates fixed by Congress (Sec. 4).

Any stations not engaged in true commercial activity were required to send and receive below the 200 meter wavelength and limit their system power to one kilowatt. Ship stations were required to transmit messages to the nearest shore station, and all messages were considered private and only for the intended recipient, unless otherwise directed by a legal court (Douglas, 1987, pp. 234-235; Howeth, 1963, chap. 12; Radio Act of 1912, 1913).

Steps Leading to the Act of 1912

Passage of the Radio Act of 1912 came only two years after the passage of the Wireless Ship Act of June 24, 1910. The structure of the process consisted of three

discussions that occurred between the passage of the 1910 and 1912 Acts: 1) The Navy continued to press the issue of regulation of private and commercial wireless companies (to include amateurs); 2) Congress addressed ratification of the treaty from the 1906 International Wireless Telegraph Conference; and 3) bills continued to be submitted to Congress to: a) address the inadequacy of the 1910 Act, and b) address a more comprehensive method of radio communications. These discussions ultimately resulted in the U.S. Congress's ratification of the international treaty on April 3, 1912 for use of wireless telegraphy; an amendment to the 1910 Wireless Ship Act on July 23, 1912; and, finally, creation of the first federal law to regulate for use of the airwaves on August 13, 1912 (Howeth, 1963, chap. 12).

Navy Continues Pressure for Regulation

In November 1911, Lt. Commander David W. Todd, Head of the Radio Division of the Navy's Bureau of Steam Engineering, addressed the American Society of Naval Engineers. He presented a case for legislative control of radio under the Department of Commerce and Labor, outlined the problems that interference caused, and called for the need to reign in the unrestricted use that interrupted such naval communications as information on navigation, storms, wrecks, or vessels in distress. Todd also profiled the aspects the Navy believed critical for controlling such interference, such as station hours of operation, power used by stations, international transmissions, and specifying authorized use of frequencies. He further noted that although the United States was well-represented at the 1906 International Wireless Telegraph Conference, and was key in formulating the provisions which resulted, the United States had taken no action to ratify the treaty. Commercial wireless companies convinced Congress the treaty's provisions

were not in the best interest of the companies in the United States (Howeth, 1963, chap. 12; Douglas, 1987, p. 142).

Ratification of the 1906 International Wireless Telegraph Conference

Congress convened in December of 1911 around the time that the invitation for the United States' attendance was withdrawn for the next International Radio Telegraph Conference planned for June of 1912. The invitation was withdrawn because previous congresses had failed to ratify the treaty from the 1906 conference. In light of this move, the Senate Committee on Foreign Relations pulled the treaty for reconsideration, and held a hearing in February of 1912.

The newly convened Congress experienced a shift in control from the Republicans to the Democrats, and consequently, "big business lost their power to control the enactment of legislation" (Howeth, 1963, chap. 12). Apparently one commercial wireless company, the National Electric Signaling Company, provided the only opposition at the hearing for ratification, citing the premature nature of legislation would be a barrier to future development. No matter, the Navy's efforts assisted the favorable report for the treaty's ratification, and the Senate approved the treaty on April 3, 1912 (Howeth, 1963, chap. 12).

Congressional Action

When Congress opened its second session on December 4, 1911, two bills were submitted on December 11, one in the House (H. R. 15357, 1911) and the other in the Senate (S. 3620, 1911). These bills pressed for the regulation of use of the airwaves with oversight power in the hands of the Department of Commerce and Labor, and were more comprehensive than what the Wireless Ship Act of 1910 contained. Yet these bills still

addressed the issues of interference, monopoly, and public welfare in the form of safety of ships and lives at sea.

Hearings for these bills began January 18, 1912 with more following in March and April. House Report No. 582 (1912, April 20) specified five purposes of H. R. 15357. The first two were to prevent monopoly of use, and to promote general use without interference, specifically noting here that interference could only be prevented by regulation framed and carried out by Congress, and that this concept was in accordance with the Commerce Clause in the U.S. Constitution. The third and fourth purposes listed were to provide for effective distress calls, and to carry out the provisions of the treaty from the 1906 International Wireless Telegraph Conference, in order to bring the U.S. to the level of other nations' regulatory models. Finally, the fifth purpose was to insure wireless service 24 hours a day between vessels at sea for the people of the United States.

Interference still topped the list of principal problems with radio at the first hearing for H.R.15357 (Radio Communication, 1912, January 18). Eugene Chamberlain from the Department of Commerce and Labor described this aspect as the first necessity for regulation (p. 7-8). Additionally, military and federal government participants presented and explained technical aspects connected with interference and made their case by describing the need to control interference for distress calls, and to avoid confusion in the airwaves in locations where station density was high and interference resulted from commercial wireless companies, the amateurs, and experimental stations. The federal government, of course, wanted priority of radio transmissions, and cited the Telegraph Act of 1866 in the case of wired telegraphy that gave priority to federal government business (p. 11). The solution presented was to separate messages on

different wavelengths, and they went further to say that without regulation to make that separation, interference would continue.

Both the federal government and the military thought it best that the formulation of rules and regulations of use of the airwaves be accomplished through the Department of Commerce and Labor. Most stations were aboard ship and it was thought that since this Department already had the charge of general shipboard inspections, this added duty seemed natural (Radio Communication, 1912, January 18, pp. 7-8, 14, 41, 45-46, 55, 64). Chamberlain also listed the objections to the treaty resulting from the 1906 International Wireless Telegraph Conference as patent rights, and price fixing by Congress (p. 7).

However, at the next hearing on H.R. 15357 (To Regulate Radio, 1912, April 18) Chamberlain testified that in addition to H.R. 15357, S. 5334, submitted in February of 1912, received strong objection to the regulations being framed by the Department of Commerce and Labor. Wireless companies and congressional senators, again, objected to the power such a provision would provide to the Department of Commerce and Labor (p. 4). There were also questions about the federal government having an exclusive monopoly over particular wavelengths, and Chamberlain explained this as being part, or the same, as the international treaty recently ratified by Congress. Finally, the discussion of the hearing turned to the use of wireless on the *Titanic,* and other vessels as sea, noting that this type of disaster is liable to occur again (p. 6).

Senate Report No. 698 (1912, May 2-6) reported on S. 3620 and S. 5334. This report called for the substitution and passage of a new bill, S. 6412 (1912) in place of these and other bills previously submitted to Congress (p. 1). This report recognized that the science of wireless telegraphy could not direct the energy of a single transmission in

isolation. Preventing interference meant a combination of varying wavelengths, adjusting geographic distances, as well as transmission times, between stations, and taking into account the type of equipment used (i.e., obsolete vs. modern) (pp. 2, 10-12). Interference was identified as the main problem of wireless technology, and the control of the use of this technology was needed so that all users would benefit.

The Senate Report went on to say the general features of the legislation are based in the Commerce Clause of the U.S Constitution indicating that "Congress shall have the power 'to regulate commerce with foreign nations, and among the several States.'" The Secretary of Commerce and Labor would be authorized to administer the provisions of the bill "as he is the officer already charged by Congress with the duty of administering the laws relating to shipping in foreign and domestic commerce" (p. 12-13). The system of licensing proposed in the legislation was compared to the Department's system for registering and licensing ocean-going vessels (pp. 12-13). Since most wireless equipment was primarily aboard ship, this seemed logical, at least to the Navy and the Department of Commerce and Labor (Radio Communication 1912, January 18, p. 11).

Although interference was the primary issue and point of discussion of this Senate Report, other issues were raised such as monopoly of use (S. Rep. No. 698, 1912, May 2-6, p. 4), intercommunication (pp. 2, 4), security of human life and property at sea (p. 5), and allocating the airwaves (pp. 9-10). The federal government had a monopoly of certain frequencies, and commercial wireless companies had to stay outside of this range, as well as the amateurs, who were relegated the lowest of the frequencies. The authors of the report also brought the reader's attention to the terms of *radio communication* used in place of *radio telegraphy*. Wireless telephony had been demonstrated at this time, and

legislators believed the bill was written to accommodate any future changes that wireless telephony would affect. Consequently, the term *communication* incorporated the transmission of Morse Code as well as voice (pp. 7-8).

When S. 6412 (1912) made it to debate on the floor of the House and the Senate, the primary concerns expressed were the bill's relationship with the international treaty from the 1906 International Wireless Telegraph Conference, the federal government's authority over electric current passing through the air, the Titanic disaster, the impact on commercial wireless companies, and the bill's main purpose regarding interference (48 Cong., Rec. 62nd Cong., 2d Sess., pp. 6015-6018, 1912). The bill's relationship with the international treaty from the 1906 International Wireless Telegraph Conference, then only ratified on April 3, was explained by comparing similarities of regulation in the treaty. The point was made that the proposed legislation needed to follow the treaty ratification in order for the U.S. to have a domestic policy in place, and to secure its place in the next international conference scheduled for June of that same year (p. 6015).

Key Participants and Key Issues

Many of the key participants for these 1912 discussions were repeat performers. Although some names changed, the three groups who vied for access to the airwaves remained the same: the federal government/military, the commercial wireless companies, and the amateurs. Familiar faces represented the commercial wireless companies such as the Marconi Co., United Wireless Telegraph Co., and the National Electric Signaling Company. Representatives from the shipping industry were also present at different congressional hearings. These individuals, from government/military and commercial wireless companies, were previously involved in the discussions for the Wireless Act of

1910. The amateurs were also represented, though their numbers at the hearings were small by comparison to the heavily weighted list of federal government/military and commercial participants. Table A1 in Appendix A provides a more complete list of key participants.

The House Committee on Merchant Marine and Fisheries and the Senate Committee on Commerce reviewed and discussed the bills submitted during this session with the participants listed above. Not much changed in the technology of the radio, nor the structure of its use in two years since the Wireless Act of 1910 passed; subsequently, the issues were the same from the discussions of 1904 and 1910. The primary use of radio was still for maritime traffic, and the concern was still for safety of ships and lives at sea. Controlling interference was paramount. Consequently, the issues were still interference, monopoly, intercommunication, licensing of commercial and private wireless stations, property rights, and public welfare.

The Radio Act of 1927

Legislation

The Radio Act of 1927 (1927) contained 41 Sections, compared to 11 Sections from the 1912 Act, and only four Sections of the 1910 Act. Radio communication was defined as "any intelligence, message, signal, power, pictures, or communication of any nature transferred by electrical energy from one point to another without the aid of any wire connecting those points" (Sec. 31). The purpose of the Act was to maintain control and regulate use, through licensing, of all interstate and foreign radio communications by individuals, firms and corporations all in the name of public convenience, interest and necessity (Sec. 1, 4, 9). Each applicant was required to file an application with the

Secretary of Commerce, and provide information as to their qualifications of citizenship, character, financial status, and technical capability. In addition, applicants provided proof of ownership and proposed location of the station, as well as planned hours of operations, frequencies and power to be used, and a description of the general purpose of the station (Sec. 10).

Construction permits were required for all stations except federal government, amateur, mobile vessels, railroad, and aircraft (Sec. 21). Licenses were not issued to those guilty of unlawful monopoly practice, could not be transferred without consent of the licensing authority, and did not signify ownership of the airwaves. If granted, the license merely provided use of the airwave channel (not ownership) for a pre-determined amount of time, and terms were set at no more than three and five years depending upon the class of license (Sec. 1, 9, 11, 12, 13).

The licensing authority also had the right to request more information regarding the application, as well as impose additional terms, conditions, or restrictions for commercial communication if it saw the need (Sec. 10). The licensee had to understand that the President had the authority to suspend, close, or authorize use for any station in time of a national emergency with just compensation to the owner of the station (Sec. 6, 7, 8). Any license could be revoked for false application statements, failure to operate as the license established, failure to observe the Act's regulations, and failure to provide reasonable facilities such as charges for service (Sec. 14). All applicants were provided with the rights to hearings and appeals to the U.S. Court of Appeals if the application were revoked or not granted initially (Sec. 14, 16). Finally, licenses were granted if

public convenience, interest, and necessity was determined from all the information the applicant provided.

The Federal Radio Commission (FRC) and the Secretary of Commerce were the two entities that held the power to administer the provisions of the Act (Sec. 3, 4, 5). The powers were to last only one year with the FRC, and with the exception of revoking licenses, then be assumed by the Secretary of Commerce (Sec. 5). After the Secretary of Commerce assumed the powers of the Commission, the Commission would then serve to hear any protests by applicants and licensees that arose from any conflict (Sec. 5). The commissioners were appointed by the President, confirmed by the Senate, required to be U.S citizens, and serve terms in rotation of two, three, four, five and six years. No commissioner could hold financial interests in commercial radio manufacturing or sales, or in radio transmission operations (Sec. 3).

In the first year, the FRC had the authority to classify radio stations, prescribe the nature and location of each station's service, assign frequencies, wavelengths, power, and technical requirements depending on the class of stations, and regulate for interference. The Commission also had the authority to require stations' record-keeping for such things as programs, energy, communication or signal transmissions, and also establish rules on what was referred to as chain, or network broadcasting. If the FRC required any change be made in a station's operation it would not be made without the knowledge of the station's owner (Sec. 4). The Commission also had the power to hold hearings and conduct investigations in order to fulfill it duties, with all of its decisions made in reference to the concept of public convenience, interest, and necessity (Sec. 4). They were required to annually report to Congress (Sec. 3).

The Secretary of Commerce had the power to classify stations, establish station call letters and inspect equipment regarding the technical requirements of the Act. He also determined qualifications of station operators, and established, as well as issued, the form of licenses based upon those qualifications (Sec. 5). Only licensed operators could use or operate the transmitting equipment (Sec. 20). The Secretary could suspend licenses for violations such as willfully damaging equipment, transmitting profane or obscene language, or maliciously interfering with other radio communications (Sec. 5). The Secretary also assumed the powers of the commission when the commission was not in session (Sec. 11), and "from time to time" was required to report to the commission violations of the Act, or orders of the commission (Sec. 5).

Management of this Act included dividing the U.S. into five zones (Sec. 2). Each of the five commissioners of the FRC were appointed from a state within one of the five zones, and served as its representative. The first, second and third zones encompassed the upper northeast, some of the mid-Atlantic states and the upper Midwest and southern states as well as Puerto Rico and the Virgin Islands. The fourth and fifth zones encompassed the rest of the upper Midwest, great plains states and the western region including the then territories of Alaska and Hawaii (Sec. 2).

Many of the regulations incorporated sections from the 1912 Act which addressed interference, minimum power use for stations, intercommunication, proximity of commercial/private stations to federal government stations, and requiring a licensed operator to listen on wavelengths designated for distress calls. No false messages of distress were allowed and equipment had to possess the capability to transmit at least 100 miles, day or night.

Also included from the 1912 Act were sections that provided federal government stations with the authority to transmit press, private, and commercial messages at reasonable rates only when commercial stations were not available, and privacy of messages was still required for all transmissions. As with the 1912 Act, the Philippines were not part of this regulation as that area was under federal government and not legislative control (Sec. 22, 23, 24, 25, 26, 27, 28, 30, 35, 36). Consequently, the Radio Act of 1912 was repealed (Sec. 39).

Those sections which specifically mentioned the word broadcasting made it clear that all paid matter broadcast by any radio station would be announced as such, whether paid by person, firm, company or corporation. The issue of freedom of speech came with a caveat. The licensing authority of the Act had no power to censor and interfere with the right of free speech by means of radio communication. However, obscene, indecent, or profane language by radio communication was not allowed. Licensed broadcasters were not obligated to allow political candidates use of the station, but if broadcasters provided use of the stations to one candidate, they were required to "afford equal opportunities to all other such candidates." In addition, licensed broadcasters had no power of censorship over the material broadcast in these instances (Sec. 29, 18, 19).

Fines for violating any rules, regulations, or restrictions of the Act's provisions were included just as in the previous radio acts, and depending on the offense, ranged from $500 to $5000, imprisonment of 5 years, or both. Jurisdiction over offenses was also the same as previous radio acts. Offenses would be adjudicated in the location of the offense, or if found on the ocean, at the location to where the offender was brought (Sec. 23, 33, 34). Finally, monies were appropriated for administering the Act, any provision

found invalid would not affect the remainder of the Act, the Act would take effect immediately upon it passage, and be cited as "The Radio Act of 1927" (Sec. 37, 38, 40, 41).

Steps Leading to the Radio Act of 1927

The process for structuring legislation for the Radio Act of 1927 can be divided into two periods: 1912-1920 and 1921-1927. The years between the 1912 legislation and 1920 saw the rise of corporate and military control, and the decline of the individuals' capability in the airwaves (Douglas, 1987, pp. 236-237). The years between 1921-1927 saw the increase in the numbers of requests for station licenses from groups such as department stores, newspapers, universities, churches, municipalities, and manufacturers which created conflict over control (Douglas, 1987, p. 315; Rosen, 1975, pp. 3, 5-6).

1912-1920 Corporate and Military Control

During the 1912-1920 time period large corporations acquired patents from the individual scientists and inventors, and began to build corporations that controlled the technology and eventually envisioned who would have access to the airwaves. The amateurs had been assigned to specific frequencies by the 1912 Act (Douglas, 1987, pp. 234, 289-290, 319). The *Radio Group* which consisted of AT&T, Western Electric, GE, and RCA defined each company's position with respect to each other. RCA concentrated in transoceanic wireless telegraphy, and ship to shore communications. AT&T worked in wireless telephony over land, and for toll, as well as manufacturing equipment through Western Electric. GE focused on manufacturing amateur radio equipment, and radio receivers (Douglas, 1987, p. 289-290; The Long Arm of Radio 1922, p. 685).

The military gained control of the all the radio stations after the United States entered World War I in 1917, and pursued federal government ownership. Legislative efforts consisted of changes in the International Treaty, prohibiting unneutral radio transmissions when World War I began in 1914, and, later, taking full control of all private and commercial radio stations once the United States entered the war in 1917 (Douglas, 1987, pp. 268-269). The Navy then pressed its advantage of the temporary federal government ownership of all radio stations in the United States. Then Secretary of the Navy, Josephus Daniels, worked with the Department of Commerce to draft legislation for permanent federal government ownership, and legislation was submitted to Congress during the war, as well as shortly after the war ended (Douglas, 1987, pp. 276-285; Howeth, 1963, chap. 27; Public Catalogue of Public Documents 1918, Vol. 13, p. 1873).

Hearings were held in which commercial companies, radio engineers, and amateur clubs voiced their opposition (Howeth, 1963, chap. 27). The bills were never reported out of committee, resulting in no legislation favoring permanent federal government control. The President returned the radio stations to the private and commercial owners on July 11, 1919 (Howeth, 1963, chap. 27). However, what the Navy could not achieve through legislation they acquired through business negotiation. As their efforts with Congress failed, the Navy worked to create the Radio Corporation of America (RCA) in October 1919 to replace the foreign ownership in wireless by buying out the Marconi monopoly. This effort "marked the culmination of the private, behind-the scenes, institutional activities surrounding wireless" (Douglas, 1987, p. 285).

1921-1927 Department of Commerce Activity

Broadcasting was not defined in the Radio Act of 1912 and the Department of Commerce struggled to find a place for it within this law between 1921 and 1927. Many events occurred during this time that eventually made room for broadcasting in the airwaves. First there was the struggle of three federal government departments over control of radio communications: the Navy, the U.S. Postal Service, and the Department of Commerce (Rosen, 1975, p. 2-3). The next steps consisted of four national radio conferences called by then Secretary of Commerce, Herbert Hoover. Later, court cases and decisions challenged, and ultimately restricted the Secretary of Commerce's regulatory authority under the Radio Act of 1912. And concurrently, there were bills submitted to Congress, congressional hearings, congressional debate, and finally, the passage of H. R. 9971 (1926) that became the Radio Act of 1927.

Hoover took office as Secretary of Commerce in 1921 at a time when attention of radio communications was shifting from the telegraphic beginnings of maritime communications with the military and commercial companies, to that of commercial broadcasting and its importance to the public (Rosen, 1975, pp. 4-5, 28-34). Hoover worked to gain control of the interdepartmental struggles over radio. He involved federal government departments by inviting them to form the Interdepartmental Advisory Committee on Government Broadcasting (IACGB), which was later called simply the Interdepartmental Radio Advisory Committee, or IRAC. He also worked closely with the commercial radio companies to build control that lay outside of the legal boundaries of the Radio Act of 1912. At the same time he worked to submit bills to congress that

would provide control of radio communication into the hands of his department (Rosen, 1975, pp. 61-63; Bensman, 2000, pp. 33-36, 55-64, 95-10, 183-200).

National Radio Conferences

The many subjects of discussion from all four conferences centered upon three broad issues: 1) the basis for which the privilege of broadcasting would be granted through a license, 2) the establishment of rules for the flow of radio communication traffic in order to minimize interference, and 3) to establish regulatory authority over radio communications in the Office of the Secretary of Commerce (Rosen, 1975, pp. 44-46, 70-77, 97-100, 103-106; Benjamin, 1998; Bensman, 2000, pp. 47-55, 80-87, 101-112, 140-150; Department of Commerce, 1922; Department of Commerce, 1923; Department of Commerce, 1924; Department of Commerce, 1925).

From the first conference held in 1922 to the fourth conference held in 1925, Hoover described radio broadcasting as a public utility. The following issues were discussed and recommendations specifically made in reference to them: interference, allocation of wavelengths, station power limitation, licensing stations as well as operators, public interest, public utility, public ownership of the airwaves, and authority for the Secretary of Commerce to regulate radio communications. However, free speech and censorship, as well as copyright were introduced into the discussion (Benjamin, 1998; Bensman, 2000, pp. 47-48, 101-119, 122, 140-150; Rosen, 1975, pp. 43-78, 97-100, 105-109; Department of Commerce, 1922; Department of Commerce, 1923; Department of Commerce, 1924; Department of Commerce, 1925).

Hoover viewed the conferences as exercises in self-government for industry, but also as a cooperative effort that included the Department of Commerce. At the same time

that Hoover described the effort as an attempt at self-government, he also pressed for legislation to establish control of radio communication within his Department (Rosen, 1975, pp. 6, 42, 53-55; Department of Commerce, 1924).

Industry's efforts were similarly contradictory. Industry participants worked together at Hoover's four conferences to arrive at resolutions that requested change to the existing 1912 law, or to create new law to provide greater authority to the Secretary of Commerce to regulate radio communications. Yet, some industry participants expressed opinions that legislation for regulating broadcasting should be postponed until the radio industry's economic base was set firmly in place. The radio industry was also opposed to providing too much power to the Secretary of Commerce (Benjamin, 1998; Rosen, 1975, p. 55; Bensman, 2000, p. 54). Finally, industry took issue with Hoover's definition of radio broadcasting as a public utility. While industry accepted the need for regulation, they did not see, or want, the concept of broadcasting defined as a public utility (Department of Commerce, 1925).

By 1925 Hoover clearly established the channels of radio broadcasting or radio communications as being owned by the public, albeit through the federal government (Department of Commerce, 1925; Bensman, 2000, p. 147). Anyone wanting a license to broadcast would be considered by standards of public interest, convenience, and necessity in terms of service to the listener. The issue of free speech was touted by Hoover, however, with the caveat that broadcasting programs be free of malice and unwholesomeness.

Although Hoover did not view copyright as a direct concern of the Department of Commerce, conference participants insisted the issue be discussed. The issue of

copyright was previously raised at the inaugural meeting of the National Association of Broadcasters (NAB) in 1923, and was finally brought to the last national conference for consideration. The Association of Composers, Authors and Publishers (ASCAP) was demanding royalties in return for the privilege of broadcasting copyrighted songs, and even though Hoover did not see copyright as a radio issue, the broadcasters were experiencing the demand for royalties nonetheless (Rosen, 1975, p. 83). Even after all the restructuring of practice and policy that resulted from the conferences, and the fact that Hoover implemented many of these recommendations outside the structure of the law, the problem of interference and congestion of the airwaves still persisted.

Court Cases

The decision of three court cases during Hoover's tenure clearly defined the extent of authority that the 1912 act provided the Secretary of Commerce. In May of 1921 the Department of Commerce revoked the license for the Intercity Radio Company for causing interference by their transmission with ship-to-shore traffic, and commercial and government stations. After the initial proceedings and hearings on the part of the Department of Commerce, additional court proceedings and an appeal, the presiding judge stated that the Secretary of Commerce did not have the authority to refuse the issue of any license. The authority over licenses provided for only an enumeration of wireless stations, not discretionary powers over issuing licenses (Bensman, 2000, pp. 44-47; Aitken, 1994, pp. 699-701; Zollman, 1930, p. 280).

The second court decision dealt with the authority of the Secretary of Commerce to assign wavelengths. In 1926, the Chicago station, WJAZ, owned by the Zenith Radio Corporation intentionally violated a provision of the 1912 law in order to "challenge the

department's authority to assign wavelengths, undercut the quasi-legal structure of regulation that Hoover created, and thereby strengthen the drive for legislation" (Aitken, 1994, p. 703; Bensman, 2000, p. 188). Station WJAZ deliberately broadcasted on a wavelength not assigned to them by the Department of Commerce, and the U.S. Attorney General in Chicago began court proceedings for prosecuting the Zenith Radio Corporation.

Aitken (1994) indicates that the judge found the problem in the interpretation of the regulations between section two and section four of the Radio Act of 1912. Section two provided licensing authority to the Secretary of Commerce, but specified that each license had to state the given wavelength. The problem was that nothing in this section clarified who stated the given wavelength. Section four comprised the 19 regulations that were to be enforced by the Secretary of Commerce. However, nothing expressly stated that the Secretary was authorized to assign the wavelengths (p. 704). The judge decided that section four prevailed over the implications in section two, and ruled that Congress did not delegate regulatory powers to the Secretary of Commerce (Aitken, 1994, p. 704; Zollman, 1930, p. 289).

The third court decision brought the question of property rights of the spectrum to the forefront and threatened the concept of public ownership of the airwaves that Hoover declared in the national radio conferences. In 1926, radio station WGES, owned by the Oak Leaves Broadcasting Company changed its transmitting frequency to within 40 kHz of another station, WGN, owned by the Chicago Tribune newspaper. The Tribune Company complained of interference with their broadcasts. The two issues to be decided were ownership of the wavelengths and occurrence of interference. The judge ruled in

favor of WGN on both issues, indicating that while Congress did not provide for protection of rights for wavelengths in the 1912 law, common law would protect the rights of its citizens through historic precedent in water rights and trade names. WGN did have rights to its wavelengths, and the 40 kHz that WGES allowed for frequency separation was insufficient to prevent interference given the technological variety of receivers the public owned. Some receivers may have been able to accommodate the difference, some may not have possessed that ability, thereby preventing the public from making a choice to listen to WGN (Aitken, 1994, p. 771-712).

Congressional Action

The issues of regulating radio communications were not absent from Congress between 1920 and 1927. Various bills were submitted, which resulted from the four national radio conferences, as well as the court decisions that rendered the Secretary of Commerce's regulatory powers ineffective. The subject of those bills consisted of: authorizing the Secretary of Commerce to regulate radio broadcasting; preventing radio broadcasters from charging the public for listening; amending the 1912 Radio Act to accommodate broadcasting; and limiting time for which licenses were granted (Bensman, 2000, pp. 32-37, 55-64, 96-101). Some bills were debated, but none became law until both the House and the Senate compromised on H. R. 9971.

The congressional debate contained the issues of interference, or chaos in the airwaves, property rights, monopoly, censorship, advertising, discrimination of political candidates' use of the airwaves, as well as use for candidates' representatives to respond, and authority to regulate broadcasting/radio communications (Godfrey, 1975, pp. 174, 205, 231, 248). These discussions were enveloped by the legal decisions, mentioned

above, stripping the Secretary of Commerce's authority to regulate radio communications. Hoover's self-governing experiment of industry broke down as stations began to change wavelengths, increase power and operate at hours they, themselves, decided upon. Both the demand for legislation from some, and the decreasing support for legislation from industry caused Congress to exercise caution in the discussion and proceed slowly with a decision (Godfrey, 1975, p. 100, 162-163).

Interference (or crowded conditions, or chaos) in the airwaves, still dominated the list of reasons that regulation was so desperately and urgently needed. Hoover had placed all broadcasting on two frequencies, as all other frequencies were previously allocated to other users under the 1912 Radio Act. As a result, the unexpected growth of broadcasting could not be accommodated, and radio signals began to overlap (Rosen, 1975, p. 38, 41). Here the congressional debate did not so much speak about the technical aspects of interference, or troubling amateurs, as much as simply the need to change the existing law, or create a new law, in order to not only accommodate adequate space for the service of broadcasting, but to also control it within all of radio communications (Godfrey, 1975, p. 158).

The discussion of monopoly dealt not only with the subject of unfair business practices, but crossed over into other issues such as censorship and property, or vested rights (Godfrey, 1975, p. 176, 191-192). Godfrey (1975) specifies that both houses of Congress agreed that there should be a strict provision of no monopoly. However, they could not agree on the "degree of possession and the degree of restraint" (pp. 180-195). Some viewed the already existing laws under the Interstate Commerce Commission and the Federal Trade Commission as sufficient to address potential monopoly in the radio

industry, adding that the Secretary of Commerce would have the authority to refuse or revoke licenses to those guilty of monopoly practices (Godfrey, 1975, p. 177).

Others did not perceive the monopoly provisions as strong enough, questioning the RCA monopoly, and not only how its stations would fit within the provisions of the Act, but also the perception that it already had vested rights in the airwaves (Godfrey, 1975, p. 176-177, 233-236). Many said that the existing monopolies already censor, and did not want one person, or group, to have the position to censor broadcast material (Godfrey, 1975, p. 179). Rebuttals argued the monopoly status of RCA and the issue of censoring was explained as "editing" on the part of broadcasters (Godfrey, 1975, p. 179).

Two congressmen provided separate comments where one stated the control of monopoly was in the hands of the individual listener as having the choice to turn off the set, or change to another program, and the other expressed a call for an independent commission to censor all discussion on evolution (Godfrey, 1975, p. 188, 209). Emphasis, however was eventually placed upon the fact that licenses were to be issued based upon public interest, not upon the want of the corporation or individual, and that the proposed commission had the full power to refuse licenses not serving the public interest convenience, or necessity (Godfrey, 1975, pp. 233, 247).

The issue of vested rights resulted from the four national radio conferences that the airwaves were a natural resource of the United States, and that it would be regulated through the concept of public interest, convenience, and necessity—arguably by either the Secretary of Commerce or an Independent Commission—and that no broadcaster could claim ownership of the airwaves (Godfrey, 1975, pp. 176, 212). However some wanted priority of the air channels to be given to those who pioneered in the industry,

were heavily invested, and could prove their efforts were in the public interest (Godfrey, 1975, p. 224-225). Still others expressed an argument for the federal government to declare rights, but was rebutted to say this would mean the end of free radio (Godfrey, 1975, p. 251).

Advertising was an issue least discussed, but nonetheless perceived as unnecessary to broadcasting, deceptive, and having the potential to be misused. The general perception was that the listening public would not care for advertisements, and as a result be compelled to change the channel in search of another program (Godfrey, 1975, p. 182; Department of Commerce, 1924). Yet one senator did not view any harm to the public if broadcasters accepted money to advertise. He frankly did not see other ways that broadcasters would generate income outside of advertising, as the sale of equipment to the listening public would eventually reach a saturation point, and the concept of taxing the public had been dismissed in previous discussions (Godfrey, 1975, p. 261-262).

Fairness or discrimination for use of the radio facilities was discussed in terms of equal opportunity for access to radio broadcasting, but specifically for access by political candidates and their representatives that would present another side of a public issue (Godfrey, 1975, p. 178-179, 189-191, 211, 221-222, 251-252, 260). Congress' fear was initially expressed in providing the service of broadcasting time, as well as a fair rate, for the service of access, but also included questions of whether existing law covered the subject of attacks of slander and libel resulting from politicians' radio speeches.

Some expressed reservations that if the use of radio facilities are open to anyone beyond the political candidate, then the question of broadcasting becomes a common

carrier issue. Consequently, the issue of common carrier was dropped as Congress perceived vagueness in the subject of public questions and public issues beyond the political candidate. They believe this discussion should be reserved for future radio development (Godfrey, 1975, pp. 178-179, 189-191, 211, 222-223, 251-252, 260).

The issue of regulatory authority, as well as the urgency for its need, was the strong point of contention in Congress. Some wanted the authority to be placed in the hands of the Secretary of Commerce. Others objected to too much power and authority being placed with an administrative position—a political appointee—and wanted a permanent independent commission created to regulate radio communications. The House envisioned an advisory committee, but the Senate wanted a permanent independent commission. Some stressed the need to pass legislation as soon as possible due to the crowded and chaotic airwaves. Others believed that Hoover's efforts were working well, and legislation should wait for the art, science, and organization of the radio industry to develop further (Godfrey, 1975, p. 175, 181-182, 213, 226, 232, 235, 254, 263).

The debate against the commission, and for the Secretary of Commerce, consisted of arguments describing too much government, too much red tape, too many crowded dockets which would work against the development of the science and industry of radio. Some feared the President would exercise power to remove commissioners when disagreements arose between the commission and the President (Godfrey, 1975, p. 206). The debate against the Secretary of Commerce, and for the permanent independent commission consisted of arguments describing the Department of Commerce as being more powerful than the President, fear that one man had the power to decide who

shall/shall not have a monopoly on the air, and that executive control meant executive censorship. Arguments for a permanent commission called for new methods of regulation with regard to the "electrical ages" (Godfrey, 1975, p. 180).

A compromise solution, reached by Conference Committee between the House and the Senate, created the Federal Radio Commission (FRC) initially for only one year, after which the powers and authority would be assumed by the Secretary of Commerce. The bill H.R.9971 passed both houses of Congress and was signed into law on February 24, 1927 (Godfrey, 1975, pp. 179-180, 192-195, 206-207; Bensman, 2000, pp. 198-199).

Key Participants

The identification of key participants in the 1927 legislative process must begin with Hoover who, as Secretary of Commerce, orchestrated the move to regulate radio communications under his department. Hoover organized and coordinated agendas for four national radio conferences whose participants outlined policy in the context of Hoover's perspective. He and the staff from the Department of Commerce drafted agendas for the four conferences, instituted many of those recommendations, which legally lay outside the 1912 radio law, pressed for legislation that established public ownership of the airwaves, and measured who had the right to broadcast through the standard of the public interest, convenience, and necessity (Benjamin, 1998; Rosen, 1975, pp. 4-5, 67, 70, 97-98; Garvey, 1976, p. 66; Bensman, 2000, pp. 32-33, 221-227; Department of Commerce, 1925).

Two Congressmen, Wallace White in the House and Clarence Dill in the Senate were also considered key participants who lead the bill to passage. These two men educated Congress as to radio's history, technology. Although other congressmen

debated the issues, White and Dill not only lead the debate on the floor of Congress, but also in committees that drafted and re-drafted versions of the bill, and congressional hearings as well (Godfrey, 1975, p. 275-281).

In addition to the Department of Commerce, other federal government departments were included in part of the legislative discussion—the Departments of the Navy, War, Agriculture, Treasury, Post Office—and agencies such as the U.S. Shipping Board were represented at the national radio conferences, as well as the congressional hearings. In fact, one person in particular carried over from the discussions of the 1912 legislation, then Major George O. Squier. Although the issue of broadcasting dominated the discussion of the 1927 legislation, these departments, especially the Navy, did not want broadcasting to reduce what the 1912 legislation established—primarily a prominent position for the Navy and protection of federal government stations from interference (Rosen, 1975, pp. 36, 46). Consistency of participation also applied to the types of Congressional Committees that reviewed proposed legislation for the acts of 1910 and 1912, namely, the Committees on Merchant Marine and Fisheries, Interstate Commerce, Interstate and Foreign Commerce, Naval Affairs, but also Agriculture and Patents (See Table A1 in Appendix A).

Other key participants in the commercial radio industry worked closely with Hoover and the Department of Commerce at the four national radio conferences, as well as the congressional hearings. Industry representatives provided their input for agendas and recommendations, as well as their opinions of regulation that blocked much of the early proposed legislation. The industry's representatives consisted of presidents, vice-presidents, general managers, and attorneys from the large corporations such as AT&T,

RCA, GE, and Westinghouse to name a few. Newly founded professional associations such as the National Association of Broadcasters and the American Broadcasters Associations also made their presence known in these discussions. Other commercial radio companies such as the Crosley Radio Company, the Independent Wireless Telegraphy Company, and the United Fruit Company also provided input as their representatives served on committees that discussed the various national radio conference issues (See Table A2 in Appendix A).

Although the legislative discussion was dominated by the activities and input of the federal government and the large corporations of the radio industry, smaller organizations began to have a presence in both the national radio conferences as well as the congressional hearings. The presence of these organizations, compared with the key participants from the previous regulatory actions of 1904, 1910, and 1912, reflect the impact that broadcasting made to not only the science and business of radio communications, but to American society as a whole. The amateurs were represented in previous legislation. However, now educational institutions who had activities in radio and broadcasting for purposes of science, as well as instruction, were also represented such as Rutgers University, Stevens Institute of Technology, the University of Minnesota and various agricultural colleges (See Table A2 in Appendix A). These groups were present to secure a place, if not insist on priority, in the airwaves because of their public service to the listener (Rosen, 1975, pp. 136-139; Godfrey, 1975).

Copyright Decided by the Courts

Important to note is the presence of the American Society of Composer, Authors, and Publishers (ASCAP) in the discussion. As mentioned above, even though Hoover

did not perceive copyright to be an issue under the heading of radio regulation, members of the National Association of Broadcasters thought enough to include the issue for discussion at the fourth national radio conference. The issue was also important enough to reach the courts in lawsuits that questioned and determined whether broadcasting copyrighted music constituted a public performance and would be subject to the 1909 law created before broadcasting came into existence.

Initially, the lower courts examined aspects such as whether the broadcaster, or the artist employed by the broadcaster, was considered an infringement of the law; whether broadcasting an already authorized performance constituted an infringement of the law; and whether a performance was, or was not, considered public if the audience was not physically present (Zollman, 1930, pp. 433-452). When the issue came before the U.S. Supreme Court, the court decided that broadcasting of copyright material was considered a public performance, rested within the intent of the existing copyright law, and required permission of the copyright owner (Important Court Decision, 1925, p. 1537).

The Library Profession

That libraries were participating in broadcasting between 1922 and 1927 is covered in Chapter One in greater detail. Articles in library journals, radio trade magazine, and magazines of the book publishing industry comprise the literature that reveals the libraries' activities in broadcasting. That literature shows that libraries utilized broadcasting to promote their mission and market their services. However, while Secretary of Commerce Herbert Hoover was hosting the four national radio conferences

to discuss regulating the airwaves as a public resource, the library profession was still discussing the role radio could play in their mission.

This author has been unable to determine the library community's direct involvement with the discussion of radio regulation. Nothing in the literature mentioned above, or archival materials from the American Library Association and the Herbert Hoover Presidential Library disclose any evidence of direct participation in the regulatory discussion at this time. None of the scholars of early radio history mention libraries as participants in the national radio conferences, or the congressional hearings.

Correspondence from the American Library Association and the Special Libraries Association exist among the Hoover's papers from his tenure as Secretary of Commerce, however, the content of that correspondence makes no reference to the subject of radio regulation. The main point of the library associations' correspondence specifically addresses a resolution for a cooperative effort between the American Library Association and the Department of Commerce to supply information for American industry and commerce (American Library Association 1922-1927, Hoover Papers).

Analysis of Radio Regulation Discussion

The discussion for regulating use of wireless telegraphy, or radio communications, marked its beginning in 1902, shortly before the Executive action of 1904, and maintained its continuity through the legislative actions of 1910, 1912, and 1927, even though the resulting legislation did not always include every issue from the discussion. However, along with the continuity of discussion came an evolution of discussion. While the subject of the issues remained constant, they began to include

change because of two things: technological changes in the medium and the social impact these changes rendered.

The U.S. Navy initiated and dominated the discussion of regulating wireless, or radio communications, and the commercial wireless companies and the amateurs were the ones who reacted with opposition. The Navy established control of federal government stations through the Executive Action of 1904, and fought to establish legislative control for commercial companies and amateur operators under the Department of Commerce and Labor. From 1904 through the end of World War I, the Navy and the Department of Commerce and Labor worked together with Congressional Committees, such as the Merchant Marine and Fisheries and Committee on Naval Affairs, to draft legislation.

The radio activity for the actions of 1904, 1910, and 1912 consisted of Morse Code transmissions and were largely considered point-to-point communications by the military/federal government, the commercial wireless companies, and the amateurs who struggled to gain and maintain access in the airwaves. Commercial wireless companies, steamships lines, as well as amateurs were invited to attend the congressional hearings and provide input. However, these commercial companies and amateurs still opposed what the Navy and the Department of Commerce drafted for congressional action.

From the early 1920s to 1927 the Department of Commerce, under Herbert Hoover's direction, initiated discussion and drafted legislation on regulating radio communications in order to accommodate broadcasting, the newcomer of radio. The Navy was still involved, but not in the same position of power and influence as before. The technology expanded to include voice transmission, and the discussion expanded to

include a greater array of users from the general public who were primarily involved in radio broadcasting.

The issues surrounding the control of use were interference, monopoly, intercommunication, public welfare, property rights, licensing commercial wireless or radio companies and amateurs, regulatory authority, and later freedom of speech and copyright. Most of these issues persisted and evolved simultaneously from the discussions of the Roosevelt Board in 1904 to the Radio Act of 1927. Interference was the main problem with wireless telegraphy in 1904, 1910, 1912, and with radio broadcasting in 1927. The problem was a technological one that was the result of many factors: deliberate interference on the part of the radio operators, high powered stations, increasing growth of the number of stations, geographical proximity of stations, as well as non-radio sources such as proximity of electrical power.

The technology could not transmit messages exclusive of other messages; at first everyone transmitted and listened on the same frequency. The solution to interference came later with knowledge of the airwave spectrum and separating the groups of users by different wavelengths. However, the knowledge of the airwave spectrum lagged behind the increasing number of requests for use of this medium and contributed to the persistence of this issue through to the Radio Act of 1927.

The monopoly issue consisted of a complex debate where the federal government and the commercial companies feared monopoly from each other. The aspects ranged from concerns over transmission flow, price fixing associated with equipment requirements, and property rights, and later included freedom of speech, censorship, and advertising. On one hand, commercial companies and amateurs feared federal

government control over their patent rights, competition, and overall control of transmissions. On the other hand, the federal government, primarily the Navy, feared control by commercial companies of transmission flow, and Congress feared price fixing regarding equipment as well as service rates. By the 1920s large commercial companies established their dominance in the airwaves and worked closely with Hoover's Department of Commerce to maintain this established place. Yet, even though Hoover proudly mentioned that radio was free of monopoly, free in programming, and free in speech, there was discussion about whether the federal government should be involved in determining quality programming for the public.

Freedom of speech, censorship, and copyright entered the discussion after broadcasting came upon the scene. Freedom of speech, or freedom of the air, and censorship were closely inter-related with monopoly and included many aspects: language, program material quality, broadcast speeches, access for political candidates, control of advertising, and limiting the number of stations allowed to broadcast to prevent further congestion in the airwaves. Censorship took the form of providing access to the airwaves for a cost, which tended to limit many who could not afford to pay. In addition, limiting the number of stations in order to prevent aggravation of an already congested situation in the airwaves provided a secure place for the large corporations.

Advertising was perceived negatively by Congress and participants at the Fourth National Radio Conference. One conference subcommittee assigned to the subject of advertising discussed banning it, restricting it, but ultimately leaving it up to industry, not the federal government, to resolve (Benjamin, 2001, p. 28-29; Godfrey, 1975, pp. 175, 182-183). Finally, copyright was brought to the broadcasters' attention by ASCAP and

was received with resistance, but resolved its application through the courts that eventually extended the copyright law to the new medium.

The discussion regarding public welfare was initiated by the Navy through the Roosevelt Board's recommendation of 1904 and was described in two ways: in terms of national defense by protecting federal government and military station activities from interference from commercial and amateur wireless stations, and protecting commercial wireless stations from interference among themselves. By 1910 and 1912 the meaning of public welfare changed to be directly associated with safety of ships and their passengers at sea, whether military or commercial.

When Hoover stepped in as Secretary of Commerce in the early 1920s, and voice was broadcast across the radio, a new audience was created for this medium. Public welfare evolved to mean the protection of the broadcast listening public. Hoover cemented this concept of public interest through the four national radio conferences. At each opening address, Hoover described a threshold of widespread communication of intelligence that was important to public education and public welfare. He pictured "the spread of pre-determined material of public interest from central stations"—materials such as news, education, entertainment and commercial communication (Bensman, 2000, pp. 49, 50). Throughout the four conferences, he described radio broadcasting as a public utility and that the industry must have a single view toward the public interest (Department of Commerce, 1924). The Radio Act of 1927 regulated for use, and use for broadcasting was determined in the name of public interest, convenience, and necessity.

Property rights evolved from concern over scientists' and inventors' patents for equipment, grappling with legal issues of allocating space in the air, that had historically

been considered a free resource to everyone, to the airwaves being described as a public resource. The Radio Act of 1927 finally declared this public resource would be owned by the people of the United States, but managed through the federal government's Department of Commerce.

The subject of licensing stations for commercial and amateur saw little change in context. The subject was on the table in 1904 with the recommendations of the Roosevelt Board and persisted through the Radio Act of 1927. The operation, or use of any wireless telegraph or radio equipment to transmit messages or broadcast, outside of the military or the federal government required a license. Each applicant was required to be skilled at using radio equipment, was subject to the form and restrictions set by the Secretary of Commerce, and was subject to fines and possible license revocation for violating any of these, as well as other provisions established by each law. By 1927, the licensing provision purported to protect against monopoly, as licenses would not be issued to those guilty of *unlawful* monopoly practice, and transferring licenses could only occur through the licensing authority: the Department of Commerce and the Federal Radio Commission (FRC).

The argument over the issue of regulatory authority existed from 1904 through to the Radio Act of 1927. In fact, the foundation of the Radio Act of 1927 is found in the Roosevelt Board's 1904 recommendations: licensing of all commercial and amateur users; regulatory authority legislatively established in the Department of Commerce through its Secretary; language to protect against monopoly; and regulating use because of the technical problem of interference, and public interest. These issues persisted

through the discussion of each law created, even though the laws may not have contained these issues.

The Roosevelt Boards' recommendation from 1904 identified the Department of Commerce and Labor as the federal government entity that would issue licenses, prevent monopolies, and essentially supervise any legislation on regulation of wireless (Howeth, 1963, appendix C). Later legislation specified the Secretary of Commerce. Through much of the proposed legislation that followed to 1927, objections from the commercial companies, amateurs, and later others, were based upon the power such a law would place into one individual, or one administrative position.

In 1909, Congressman Roberts of Massachusetts proposed the creation of a seven-member board comprised of people from federal government, commercial companies, and a scientist that would devise a plan to govern wireless communications *for all concerned.* However, such an entity was not realized until regulatory authority was established in 1927 between the Secretary of Commerce and the FRC.

The key participants in the early part of the formative years were the Navy and the Department of Commerce, who worked to establish the best location in the spectrum for themselves and for the control of all others—commercial and amateur. Later, Hoover and the large commercial corporations worked together to secure regulatory authority with the Department of Commerce, and secure a place in the broadcast spectrum for the large commercial corporations. Although the libraries provided programs for broadcasting, no evidence yet suggests their presence in the discussion for regulating this medium. As mentioned in the first chapter, this profession was concerned with understanding how they could use it in promoting their mission and services.

The formative years of regulating radio communication reveals the key issue was the control of the use of this communication medium, and that this control was based in the movement of commerce. Wireless telegraph, or radio transmissions were identified as commodities of commerce, and Congress possessed the power to regulate commerce, whether international or interstate. Yet, even though most proposed legislation for wireless or radio communication was defined within the scope of the U.S. Constitution's Commerce Clause, Congress was hesitant to impose regulation of use for this medium.

Most congressmen did not comprehend the technology, they were uncomfortable with regulating a science that was considered new and undeveloped, but more importantly, they favored the opposition to regulation from commercial wireless companies. However, the airwaves had to be divided among the many users struggling for a space in order to prevent interference among those who used radio communications. The sequence of legislation that resulted grew from one of only a minimal requirement of equipment and personnel, to dividing the airwaves among the federal government/military, requiring licenses of commercial companies and amateurs, to finally establishing regulatory authority with the Department of Commerce and the FRC.

Analysis of Internet Regulation

This chapter presents and analyses the executive and legislative actions relating to the discussion which established use of the Internet, and the library profession's involvement in this discussion. The period covers 1958 to 1996 and represents, respectively, the time the government recognized the need for research and development in computer science, and the year the Telecommunications Act of 1996 deregulated and provided the groundwork for an open market for competition in the telecommunications industry. The act also updated the standards for obscenity and indecency to include the Internet. A brief history of the time period is provided, and the identification of the key participants, issues, and executive and legislative actions are presented to provide the picture of how each policy or regulatory action evolved. The analysis presents three broad concerns that persisted throughout the discussion.

Brief Historical Context 1958-1996

Events of 1958-1996

The era of Internet development began during President Dwight D. Eisenhower's (1953-1961) second administration. He created the Advanced Research Project Agency (ARPA) in 1958 within the Department of Defense (DOD), shortly after the Russians launched the Sputnik satellite in 1957. The creation of ARPA came after several significant events in the history of the United States: World War II ended, Joseph McCarthy's communist investigating activities were censored in 1954, the rise of the civil rights movement in 1955, and the Defense Highways Project, which created our current Interstate Highway System, in 1956 (United States, 2003).

Initially, ARPA's role focused on space-related technology. However, space research moved to the also newly created National Aeronautics and Space Administration (NASA), and this move left ARPA with research duties concentrating on computer science and computer networking. ARPA's computer users comprised not only the DOD staff, but businesses contracting with the DOD, and universities participating in the research (Moschovitis, et al., 1999, pp. 34, 43).

The entire period of Internet development spanned the terms of eight U.S. presidents, from Eisenhower in the 1950s to Bill Clinton in the 1990s. This time period included the Vietnam War of the 1960s and 1970s, which encompassed the presidential terms of John F. Kennedy (1962-1963), Lyndon B. Johnson (1963-1968), and Richard Nixon (1969-1974). This period also included the energy crisis, Watergate scandal, Nixon's subsequent resignation, and his unconditional pardon by Gerald Ford (1974-1977). Jimmy Carter (1977-1981) successfully brokered peace between Egypt and Israel, but ended his term with an unsuccessful struggle to free American hostages in Iran (United States, 2003).

The 1980s and the early 1990s saw Ronald Reagan (1981-1989) and George Bush (1989-1992) try and reverse the growth of big government and rejuvenate the economy. However, their efforts resulted in the U.S. becoming the world's largest debtor nation by the late 1980s. They cut spending for domestic programs while increasing spending for the military through projects such as Strategic Defense Initiative in the early 1980s, to the war in Kuwait in 1990, which increased the national debt and led to recession (United States, 2003).

This period also saw a continuing pattern of deregulation that began with the Ford and Carter administrations. Policies were set in place to minimize government intervention in the market economy with such industries as banking and the airlines in the 1970s, and ongoing discussion of deregulating broadcasting occurred from the mid 1970s to the late 1980s. Consequently, there were efforts to rewrite the Communications Act of 1934 during this time. The Reagan and Bush administrations became more tolerant of corporate consolidation as mergers began to occur. However, it was also during this time that the federal courts divested the monopoly of AT&T. These policies coincided with technological breakthroughs such as desktop computing and high speed digital transmission (The Contemporary World, 1999; Sterling & Kittross, 2002).

Japan represented a threat to the U.S. computer industry in the 1980s. And although the U.S. possessed the economic lead in supercomputing during this time, Japan had advantages over the U.S. in taking the lead in manufacturing and further developing computer technologies that the U.S. had originally developed. Japan also had the advantage of selling their supercomputers to the rest of the world where the U.S. companies were restricted by export controls to many countries (Forbes, 1995, pp. 98-109).

The 1990s brought Bill Clinton into the White House for two terms as president, along with Albert Gore, Jr., as vice president. Clinton's tenure in office is marked by not only sex scandals, objections over proposed health care reform, and impeachment proceedings, but also the first balanced budget since 1969, increasing value in the stock market, and low unemployment rates during his second term (United States, 2003). It was during his term as president that the National Information Infrastructure (NII), "a

seamless web of communications networks, computers, databases, and consumer electronics that will put vast amounts of information at users' fingertips," became an agenda item for his administration (Brown, 1993).

ARPANET and Computer Technology Growth 1969-1990s

ARPANET, the computer network, was created in 1969, and soon connected four institutions, University of California at Los Angeles, University of California at Santa Barbara, the University of Utah, and the Stanford Research Institute. By the late 1970s, many universities connected their local area networks to ARPANET using an open standard Transmission Control Protocol/Internet Protocol (TCP/IP), the computer architecture standard that would allow interface with different computer systems (Moschovitis, et al., 1999, p. 61-62; Tehan, 2001, p. 3). By 1984, ARPANET split into two separate networks, the ARPANET, forerunner of the Internet, and the Data Defense Network, whose use was restricted only to the Department of Defense. However, the users of ARPANET still comprised the Department of Defense staff, universities and research institutions, and those businesses contracting with the DOD (Nolan, 2000, p. 240; Tehan, 2001, p. 3).

In 1985, the National Science Foundation (NSF) created many national supercomputer centers across the U.S., and universities began to connect their local and regional area networks to what became known as the NSFnet. By 1987, the NSFnet became the backbone, or the foundation to which all other networks would connect, and by 1990 ARPANET then ceased operations (Moschovitis, et al., 1999, p. 145; Tehan, 2001, p. 3).

At the same time that the Department of Defense conducted its research into computer networking and developed the ARPANET by 1969, private enterprises and organizations in the United States were learning about and using mainframe computers, minicomputers, and microcomputers. Many new developments in computer technology occurred between 1950 and 1970. There were efforts to produce faster and more powerful supercomputers to perform a high volume of calculations at high speeds. The modem was invented, which utilized phone lines to transfer data between computers. Patents for the microchip were filed; this technology would later increase the power of the computer, and at the same time decrease its physical size. The packet-switching concept was introduced, and it was this technology that eventually became the framework for data transmission across computer networks, and eventually, the Internet (Moschovitis, et al., 1999, pp. 35-36; Cortada, 2000).

According to Nolan (2000, pp. 227, 240, 254-257) the use of information technology by business passed through three eras: the Data Processing era of 1950 to 1980, the Microcomputer era of 1980 to mid-1990s, and the Network era of 1995 to the present and beyond. The first era of data processing was characterized by large mainframe computers which comprised accounting and budgeting systems and had peripheral devices for input, output, and storage. The second era, entitled Microcomputer era of 1980 to mid-1990s, encompassed personal computers and workstations. This era brought the computer out of a centralized location and onto the individual's desk in business offices, and organized into internal networks, or intranets, and eventually into the homes of Americans. The World Wide Web, Hypertext Markup Language (HTML),

and Mosaic, the first World Wide Web browser came in the early 1990s (Nolan, 1993, p. 241).

The Network era of 1995 to the present, the third era, saw businesses, as well as the general citizen, connect directly to the Internet. However, the network changed the work of businesses and organizations from a linear assembly-line method with distinct divisions of labor, to that of a multi-dimensional method that incorporated the generation, flow, and use of information into everyone's work function.

In 1993, the NSF began a two-year preparation to restructure the Internet in order to have private commercial backbone operators take over its management through what they constructed as multiple Network Access Points in order to avoid the potential of monopoly. Those commercial operators were Ameritech, PacBell, Sprint, and MFS Datanet (Tehan, 2001, p. 4). The Internet grew from four computer nodes in 1969 to approximately 5,000 networks in February of 1992, to 14.7 million hosts (or computers) in 1996 (Moschovitis, et al., 1999, pp. 61-62; Chinoy & Braun, 1992, p. 8; Nolan, 2000, p. 241). The works of Moschovitis, et al. (1999), Naughton (1999), Rowland (1999) and Winston (1998) provide a complete history on the creation and evolution of the Internet.

Legislative Discussion

From 1958 to the 1970s legislation related to new technologies were limited to proposed bills that focused on the subject of promoting science, primarily physical sciences, mathematics and engineering. Proposed legislation addressed promoting these subjects in secondary education, as well as in higher education. Many bills promoted scholarships and loan programs for colleges and universities specifically in these subject areas. There were also bills to promote economic growth by supporting state and

regional research centers with the purpose to hand over the science to American businesses. This method would later be referred to as technology transfer (Monthly Catalog, 1958, 1959, 1960, 1961-1965, 1966-1970, 1971-1976). There was no discussion of computer networks and networking at this time. The research for this subject proceeded, but was restricted to the internal workings of ARPA.

Legislation, and public laws for computer technology began to appear in the mid to late 1970s as more government agencies were using computers to process and store data for their operations. Public laws covering information policy and technology issues applied to areas such as telecommunications broadcasting and satellite transmission; international communications; library and archives policies; privacy; security, regulation, and crime; intellectual property; education, innovation, and competitiveness; federal information resources management; and government information systems (Chartrand, 1991).

For example, some laws amended the Communications Act of 1934 that required telephones to be hearing aid compatible, or established conditions for governing cable communications. The laws for libraries and archives addressed construction of libraries, mass deacidification projects, and grants for libraries in higher education for technology enhancement. Laws protected motor vehicle driver information, as well as mental health patients, punished offenses for unauthorized access, required copyright permission for sound recordings, protection of computer chips, as well limiting the exclusive rights of owners of computer programs.

The Office of Science and Technology Policy (OSTP), and the Federal Coordinating Council for Science, Engineering and Technology (FCCSET) were created

in 1976 with the purpose to advise and assist the President in scientific and technology matters. However, it was not until the early 1980s that Congress turned its attention to legislation regarding a computer network and it audience of users.

As a result of Japan's aggressive efforts in computing during the late 1970s and early 1980s, the discussion of legislating the federal government's role in this industry began after a report completed in 1983 by a council appointed by the Office of Science and Technology Policy. The report's main focus was to protect the U.S. computer industry's economic lead, through government investment and a collaborative effort between the computing industry, the federal government, and scientific community. Part of that effort included the creation of a network for the exchange of information among these three groups. Then Senator Albert Gore, Jr. (TN) would take up this cause and work to establish legislation for a computing program that evolved into the Internet.

By the 1990s the discussion for legislation addressed the network as it evolved to be labeled the National Information Infrastructure (NII). President Bill Clinton and Vice President Gore promoted this infrastructure as providing economic benefits in terms of job creation, technological development through research, as well as health care reform, dissemination of government information, and an "electronic commons" that served the public interest by providing universal access to information sources for all citizens (Brown, 1993). Clinton's administration continued the legislative discussion that began with the Office of Science and Technology Policy's efforts to examine the emerging issues of the computing industry in 1983.

This chapter documents the discussion of legislating a national network as it emerges from the initial efforts of the FCCSET report completed in 1983 and eventually

came to be known as the Internet. Five actions of policy and regulation will be examined, which consist of two executive and three legislative, and are marked by the years 1983, 1986, 1991, 1993, and 1996. These action represent the beginning of the United States' efforts to grapple with the use of a new communications medium.

The initial approach to policy on the Internet was to sustain the U.S.'s economic lead in the business of supercomputing. Initially, the users were government departments, universities connected with government research, and the computer and telecommunications industries. Later, a greater part of society in general, such as libraries, schools, and non-profit agencies, brought to the table their voices and the concept of access and availability for all of society. Tables B1 and B2 in Appendix B include a list of the bills and the key participants in the discussion for Internet regulation.

Executive Action - The Office of Science and Technology Policy

The year 1983 represents the Executive Office's first effort to examine the emerging issues in computing (Forbes, 1995, p. 66). The Office of Science and Technology Policy (OSTP), part of the Executive Office, formed three panels from federal government agencies to study the emerging issues in the area of computing. The results of this study were circulated among several federal government agencies in late 1983 and later the Federal Coordinating Council on Science, Engineering, and Technology (FCCSET) submitted to the OSTP as an official report in 1985 (Forbes 1995, p. 42, 66, 68). This report recommended the federal government invest to increase the speed of supercomputers, to network the computer systems, and to develop artificial intelligence in order to sustain the U.S. lead in computing (Forbes, 1995, pp. 66-67).

As part of this report, the FCCSET specifically noted that a collaborative effort on the part of federal government, industry, and the scientific community was necessary to accomplish these recommendations. This council wrote a report on high performance computing which recommended, apart from the specific technical issues addressing computer architecture, the importance of maintaining a vigorous coordinated research program, protecting intellectual freedom, improving methods of technology transfer, investigating infrastructure requirements to support the research community, maintaining an interagency coordination effort, and developing an adequate training program (Forbes, 1995, p. 75). This report emphasized the importance of the industrial sector, and described the government's role as making regulatory policies attractive for the corporate sector (Forbes, 1995, p. 76). However, the OSTP and the Executive Office did not care for the panel's recommendations and had no desire for government and industry to form partnerships in this area (Forbes, 1995, p. 76).

Computer Network Study Act

Senator Albert Gore, Jr. (TN) introduced the Supercomputer Network Study Act of 1986 in June of that same year. This bill required the OSTP to report to Congress on the networking needs of the academic and research sectors in the United States (Forbes, 1995, p. 156). Since the Executive Office took no action to forward the FCCSET report to Congress, Senator Gore wanted Congress to require the OSTP submit the report directly (Forbes, 1995, p. 156). The bill was introduced on the floor of the Senate, referred to the Committee on Commerce, and no reports were published. Ultimately, this bill was incorporated into the National Science Foundation Authorization Act for Fiscal

Year 1987 which authorized the NSF with funding for fiscal year 1987 (H. R. 4184, 1986; National Science Foundation Authorization Act for 1987, 1986).

The Computer Network Study represented section 10 of the National Science Foundation Authorization Act for Fiscal Year 1987 (1986). This section of the act charged the OSTP to study the critical problems, as well as current and future options regarding communication networks for research computers at universities and federal research facilities in the United States. The study had to include analysis of networking needs, benefits and opportunities, and networking options. The OSTP was required to submit the report to Congress within one year from the time the act.

Steps Leading to the Computer Network Study Act

In 1985 the House Committee of Science, Space, and Technology held hearings to examine the subjects that FCCSET identified in their 1985 report to the OSTP. The hearings, held between May and November, included discussion on technology transfer, international cooperation in science, technician training in community colleges, and automation and robotics in advancing competitiveness for the United States (Legislative history of P. L. 99-383, 1986).

One hearing from 1985 particularly addressed the subject of Federal Supercomputer programs and policies, and was held by two House subcommittees: one on Science, Research and Technology, and the other on Energy, Development, and Applications. Congressman Douglas Walgren (PA), a member of the House Committee on Science, Space and Technology, was not present, but prepared comments for an opening address. The hearing's purpose was to assess adequacy of current federal initiatives and plans for future needs of large scale scientific computing, and to hear

witnesses' perspectives on the federal government's role in achieving short, as well as long term, scientific computing needs (Federal Supercomputing Hearing, 1985, June 10, pp. 4-5).

The witnesses included people mostly from government and education, but included one representative from the auto manufacturing industry. Mr. Henry A. Zanardelli, of the Ford Motor Company, encouraged government to foster supercomputer research at smaller academic institutions, as these institutions provide much of the graduates they hire (Federal Supercomputing Hearing, 1985, June 10, p. 5). The witnesses from higher education consisted of officials from the supercomputer centers at the University of Illinois, Cornell University, Lawrence Livermore National Laboratory, and Florida State University.

Dr. Larry Smarr, from the University of Illinois explained the concept of a network through which personal computers would connect to supercomputers, and raised the issue of the management of such a network. Smarr indicated the need for decisions about roles of the NSF, the private sector, and the Department of Energy for such an undertaking (pp. 87-88). In fact, Smarr emphasized that the process of creating and managing such a network would be as difficult and complex as previous systems such as telephone, electric power, water, highway, and railroads (p. 174). The difficulty was determining how monetary and regulatory resources would be provided by the private sector and the government (p. 174).

Other supercomputer officials present mentioned issues of cooperation among federal government agencies, states, and the private sector, emphasizing that efforts to build a network should not be fragmented among different entities (p. 173). Technical

issues were also part of higher education's concerns, including aspects such as adequate file storage, software development, higher transfer rates for data, as well as training skilled professional in supercomputing (pp. 113, 121, 144-145, 175).

Federal government witnesses for the hearings of the House Committee of Science, Space and Technology, consisted of representatives from the Office of Energy Research/Department of Energy (DOE), the National Science Board/National Science Foundation (NSF), and the Defense Advanced Research Projects Agency (DARPA). These representatives clarified the efforts of their agencies by providing brief descriptions and the extent of their operations, and revealed a hesitation about plans for creating a network and expanding access to that network.

Dr. Alvin Trivelpiece's description was brief. He explained that much of the projects in the Department of Energy were classified, and that the Department was in no position to provide access to the general community of universities, due to the classified nature of their work. Dr. Mary S. Good described NSF efforts as moving science forward, training students, stimulating the computer industry, and providing not only access to a few researchers, but an environment in which science and engineering are advanced (pp. 35, 38). However, she added that although NSF was working to reach more than just few researchers, they did not have the budget to support supercomputing needs of everybody in the country.

Dr. Charles Buffalano, of DARPA, explained that while they were developers of ARPANET, the operation was a program management agency and not a laboratory. Their agency existed to protect the Department of Defense and the people of the United States from technological surprise, and explained that they do work with universities on

unclassified work (pp. 44-45). The information from these 1985 hearings provided the fuel for a bill that did eventually require the OSTP to produce a study for Congress' review.

In 1986, the National Science Foundation Authorization Act for Fiscal Year 1987 was referred to, and reported upon favorably, by the House Committee on Science and Technology (H. R. Rep. No. 99-619, 1986, pp. 1-74). This report briefly explained the NSF goals in the area of advance scientific computing activity. The NSF was developing supercomputer centers and creating a national scientific research network (NSFnet), and at that time, planned first to establish an Internet and then provide additional connectivity, increasing the network's capability in terms of bandwidth, performance, and functionality (H. R. Report No. 99-619, 1986, pp. 17-18).

The NSFnet was expected to be the basis for general purpose computer communications, and a network for the academic research community and associated industrial researchers (H. R. Report No. 99-619, 1986, p. 19). The Committee expressed direction for the design, plans, management, and implementation of the Internet, NSFnet, and a national research network to consult "all categories of potential users, including the industrial community and other federal agencies" (p.19).

In addition to committee hearings, Congress requested that the House Committee on Science and Technology, and the Office of Technology Assessment (OTA) complete a background paper on the subject of federal government plans and policies in the area of supercomputers in March 1986 (Office of Technology Assessment, 1986). The OTA's findings cited program management, technical specifics of networks, and software development as issues of concern.

Specifically under the issue of program management, more coordination was called for among the various federal government agencies because "no single agency holds lead authority in advanced research and access" (p. 4). The interagency panels under FCCSET were viewed to have limited abilities to alter or implement government policy (pp. 4, 22-25). Each of the federal government agencies involved in supercomputing had unique programs, goals and mission requirements, and operated under a variety of resource or allocation policies (p. 24). Finally, limited human resources was also a critical factor as expert personnel required to manage such computer centers would be vital (p. 4).

In addition to calling for more coordination among government agencies, the OTA felt it necessary to re-examine the federal government efforts in this area and involve the scientific and research users, as well as the private sector, in a broader examination of the role of the new information technologies. The OTA noted that the industrial community had not been included in NSF's plans for a national research network (pp. 4-5, 27). The National Science Foundation Authorization Act for Fiscal Year 1987 (1986) passed into law on August 21, 1986. There was complete congressional support for the NSF, and consequently there was no debate over any portion of this bill on the floor of Congress (132 Cong. Rec. H.R. 4184, 1986, June 26, pp. 15689-15696).

Computer Network Study Completed

The OSTP completed the report and submitted it to Congress in late 1987, with not only conclusions and recommendations, but with the responsibility of producing an implementation plan. According to Forbes (1995) material from the previous FCCSET

was incorporated into the new report (p. 258). The FCCSET was charged with completing the study and formed three subcommittees for the task: Science and Engineering Computing, Computer Research and Development, and Computer Networking Infrastructure and Digital Communications. The participants who prepared the report were largely from federal government departments and agencies, and higher education, industry and national laboratories (pp. 260, 262, 263).

These participants met in a workshop to present papers on the subject of networks that formed the basis for the report. Six issues were identified as paramount: 1) access requirements and future alternatives; 2) special requirements for supercomputer networks; 3) internet concepts; 4) future standards and service requirements; 5) security issues; and 6) the federal government's role in networking (Forbes, 1995, p. 261). The OSTP concluded that the U.S. needed to maintain leadership in the market of high performance computing, research, and technology transfer. Collaboration in this effort was needed among higher education, industry, and government, and that it was important to accelerate deployment of high performance computing networks (pp. 265-266). The OSTP recommended creating a research and technology strategy, taking the lead in research, providing support for training, and coordinating research and development for the network with government, industry and universities (pp. 266-267).

The Executive Office concluded that this report represented a broad consensus on this subject and three subcommittees were created to accomplish the task of producing a plan for high performance computing (Forbes, 1995, p. 268). The Networking Subcommittee worked on a plan for the national research network; the Science/Engineering Subcommittee reviewed the *Grand Challenges* (or complex

computation problems and modeling) of high performance computing systems; and the Computer Research Subcommittee worked on software and hardware issues (pp. 270-271).

Forbes (1995) notes that the OSTP report failed to address the proper federal role in the research and development process, and left this to be determined by debate (pp. 269-270). Congressman Douglas Walgren (PA), Kenneth King and James Emory, of EDUCOM, wanted to hear from a broader user base that included higher education, libraries, manufacturers, and consumers (p. 82).

Key Participants of the Computer Network Study Act

The key participants in this process were the various departments, offices, and agencies, of the federal government; people in industry; and scientists, engineers, and managers of the NSF's supercomputer centers from higher education who served as witnesses at congressional committee hearings (Forbes, 1995; Federal Supercomputing Hearing, 1985, June 10). Congress, itself, and their Committees and Subcommittees were also key participants. These were the people who outlined the structure of a technological communications network, and consequently the access to that network.

Key Issues of the Computer Network Study Act

The key issues were, first and foremost, commerce. These groups wanted federal government investment, research and development, and improvement in technology transfer for the supercomputer industry in order for the U.S. to maintain an economic lead in the industry. Aside from the technical specifics such as computer architecture, file storage, data transfer rates, and software development, the issues focused tightly on coordination of research programs among the various federal agencies, as well as

collaboration among government, industry, and higher education in the creation of the network. Educating and training a workforce in the science of supercomputing networks was always present in the discussions. Finally, management issues for such a collaborative effort were viewed as essential, with the roles of the three groups identified in structuring such a network topping the list: government, industry, and higher education.

However, important to note on discussion of roles was the complexity of establishing a regulatory structure upon which the network would be placed. This issue was present in the FCCSET report and congressional hearings from 1985. Under the heading of management came not only clarifying the roles of each participant, but also concerns over access, standards, requirements and guidelines, security issues, and intellectual freedom for scientists and researchers using this network.

Public Reaction

The press, during this time, merely echoed these key issues identified by government, industry, and higher education, one was the development of supercomputers, critical for "national defense, economic growth, and advances in science" (Boffey 1983, January 19). There was no discussion of the issues from a standpoint of public policy. From 1983 to 1987, the few press articles emphasized the importance of this scientific revolution and its relation to American international competitiveness. These articles indicated that a national program was necessary as "American computer manufacturers have neither the financial resources nor commercial motivation to develop supercomputers" (Hanley 1987, April 20; Boffey 1983, May 5). In fact, Harris, (1994) in a study on trends, indicated that newspaper press coverage on

issues dealing with the Internet was late relative to scientific, research, and trade literature, which did not become a concern until about 1993 (p. 122-123, 129).

The High Performance Computing Act of 1991

Legislation

The High Performance Computing Act of 1991 (1991) comprised 14 sections, and had the purpose to ensure that the United Stated continued its competitive and economic lead in the global competition of the supercomputing industry (Sec. 2, 208). The Act defined high performance computing as advanced computing, communications, and information technologies that solved what was referred to as *Grand Challenges*, or scientific problems that required the computational power of high performance computing. High performance computing comprised high-speed and high-capacity network systems considered as special purpose, experimental, and including application, as well as operating system software (Sec. 4). Congress' findings stated that high performance computing was critical to U.S. prosperity, its national and economic security, its industrial production, and its education in science and engineering (Sec. 2).

The act directed the President to implement a program for high performance computing that specified federal support for research and development, interagency planning and coordination, and a greater collaboration among federal government and its laboratories, industry, the existing high performance computing centers (established by the NSF), and universities (Sec. 3). The Act also created a National Research and Education Network (NREN) that would link research and educational institutions, federal government, and industry in every state, and promote development of an Information Infrastructure providing access to databases and services (Sec. 3, 101, 102). More

technical in nature, this Act concentrated on stimulating and promoting research and rapid development and distribution of software technology, as well as aid to accelerate the development of computer systems (Sec. 3, 101). Finally, the program encouraged investment in research and education, which was critical in maintaining the economic lead in this industry (Sec. 3).

The program created by this act established goals and priorities, policies for management and access, security requirement and standards for federal government computer networks, and oversight and evolution of the NREN (Sec. 101). An Advisory Committee was to be created, consisting of non-federal members from research, education, library communities, network providers, and industry. They were charged with providing advice and information for the high performance computing program's progress, and whether the program actually contributed to the U.S.' economic lead in computer technology (Sec. 101).

The National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the Departments of Defense (DOD), Energy (DOE), and Commerce (DOC), each were identified as primary participating agencies to support the creation of the National Research and Education Network (NREN). These agencies and departments were to work with private network service providers, state and local agencies, libraries, educational institutions, and organizations to ensure access for researchers, educators, and students. This network access would provide links to high performance computing systems and electronic information resources maintained by libraries, research facilities, publishers, and affiliated organizations (Sec. 102).

The NREN was to be designed, developed, and operated in collaboration with its users in government, industry, research, and education to foster industrial competition and investment in high speed networking with the telecommunications industry, and promote research and development to establish privately operated high speed networks (Sec. 102).

In addition, laws were to be created regarding copyright, intellectual property protection, national security, and the use of this network in general. Interoperability of federal and non-federal networks was required. The NREN would support research and development of regional networks, software, and hardware by serving as a test bed for high performance computing (Sec. 102).

The National Science Foundation (NSF) was the agency responsible for infrastructure support for all science and engineering disciplines, and assisted those educational institutions who were not able to connect to the NREN. The NSF served as the point of contact regarding access and use of this network, and to upgrade not only this network, but also the regional networks as well.

Other agencies identified with establishing the NREN were to provide basic and applied research activities in each of their fields. NASA, the Environmental Protection Agency (EPA), the Department of Education, and the Department of Energy were to provide research and applications and software tools, respectively, in computational science in aerospace sciences, ecosystem and atmospheric models, and were also to coordinate activities with libraries, schools, facilities, and research groups, and energy applications and mission activities (Sec. 202, 203, 205, 206).

In addition, the Department of Energy was responsible for creating a collaborative consortia for high performance computing research, and for technology transfer to the private sector (Sec. 203). The Department of Commerce's responsibility included research in standards, guidelines, and benchmark tests for high performance computing and for ocean sciences, including weather prediction through its National Institute of Standards and Technology and National Oceanic and Atmospheric Administration components (Sec. 204). The Secretary of Commerce was also responsible for a study evaluating the impact of federal procurement regulations on sharing of proprietary rights to software, and the regulation impact on development of software tools and techniques (Sec 204).

Reports were required annually to Congress, as well as to the Office and Management and Budget. The Secretaries of Energy, Commerce, and the Director of the Office of Science and Technology Policy (OSTP) were required to report on agencies activities, regulatory impact, and the program's progress which included annual budget and special activities for education, research, and technical development respectively (Sec. 203, 204, 101, 208).

Steps Leading to the High Performance Computing Act of 1991

The OSTP report and the Executive Office concluded that a broad consensus existed regarding the need for a high performance computing program. However, the steps toward the legislation of 1991 revealed rivalry and varied perceptions within Congress and the federal government about what the legislation for a high performance computing program should contain and who should manage it. In addition, special interest groups, including the library profession, now provided a voice in the discussion

and expanded the concept of use beyond merely the federal government, research and higher education, and industry.

The first steps began with a congressional hearing in August of 1988 (Computer Networks and High Performance Computing Hearing, 1988, August 11). The hearing's purpose was to examine the existing situation of computer networking in the United States (p. 5). In addition to the technical aspects of increasing the network's capacity for data transmission, the information gathered from many experts in the field of scientific research reinforced previously expressed issues of economic concern for the U.S.'s lead in supercomputers, providing network access to government, industry and higher education, and support for research and training.

However, the information from these experts also emphasized the role of public funding and the need for leadership in management of such a network. The list of witnesses were scientists largely from government and higher education. Although digital library initiatives were mentioned in the hearing's transcripts, and Senator Donald Riegle's (MI) opening statement mentioned "our capacity to gather information and share it widely throughout our society," there were no library professionals included at this hearing (p. 5).

Gore introduced two bills in late 1988, the National Educational Software Act, and the National High-Performance Computer Technology Act. The National Educational Software Act of 1988, solely addressed the creation of a national software corporation which would develop and distribute computer software, never saw debate (Forbes, 1995, p. 288, 292-230). Both bills were introduced late in the congressional

session. However, only the National High-Performance Computer Technology Act of 1988 was re-introduced into the next session of Congress.

This act directed the President to develop and implement a plan for high performance computing, have the National Research Council coordinate related activities among federal government agencies, and have the NSF develop and manage the network to link government, industry, and educational community. The National Telecommunications and Information Administration (NTIA) in the Department of Commerce had the responsibility to report on current telecommunication regulations, and the National Institute of Standards and Technology (NIST) was to develop standards for interoperability, security, common use interfaces, and software. The OSTP was to direct the development of the national information infrastructure of services, databases, and knowledge banks available through this network. Mechanisms for technology transfer to industry were also included (National High Performance Computing Act, 1988; Forbes 1995, pp. 292-230). However, since Congress never had the chance to review, report and debate this bill, the bill would be re-introduced in the first session of the next Congress.

In fact, several bills addressing the plan for a High Performance computing Program were introduced between 1989 and 1991, and these bills varied only slightly from the National High Performance Computer Technology Act of 1988. Differences were found in the entities planned to assist the President in the implementation of the program. For example, Gore's 1988 bill designated the President, through the OSTP, to create and implement the plan for high performance computing, along with a national software corporation. When he introduced the National High-Performance Computer Technology Act of 1989, Senate Bill S. 1067, in the next session, the President was to

create the plan. However, now, through the FCCSET, a council under the OSTP, the FCCSET would be responsible for implementing the plan. The National Software Corporation was no longer listed, but some of its concepts were re-distributed throughout the bill in a different manner.

The NSF, along with the Departments of Defense, Energy, Commerce, as well as NASA, each were to establish the network that would link government, industry, and the education community. Gore included an entire section for the Department of Energy, giving the Secretary of Energy direction to establish a high-performance computing program solely for the DOE, and libraries were now listed among the groups that the NSF would link to the network (National High-Performance Computer Technology Act, 1989).

Most other changes were minor, by comparison, such as clarifying that this network would not include computer systems that would process classified information. Responsibility for submitting reports and studies on such topics as regulatory issues changed from one agency or individual to another. Important to note, however, is that this bill planned for eventual commercialization of the network (National High-Performance Computer Technology Act, 1989).

Bills submitted by other congressmen addressed the High Performance Computing program. Most were similar to Gore's bill, and access was still designated for government, industry, and education. These bills proposed to amend existing technology acts with the purpose of including a provision for a high performance program, which very briefly described the role for the President and the FCCSET to plan and implement. They mandated requirements for funding and management of the

network, responsibility for specific reports and studies, and underscored support for basic computer research and educating more researchers in computational science (Technology Administration Authorization Act, 1989; National High-Performance Computer Technology Act, 1989; American Technology Preeminence Act, 1990).

The Department of Energy High-Performance Computing Act of 1989 (1989), however, represented divergent legislation regarding high-performance computing, and a national network. This bill gave all the responsibility for creating and implementing the High-Performance Computing plan and establishing a national network directly to the Secretary of Energy. However, with the exception of the Secretary of Energy having this sole task, there was little difference between this bill and the section on the Department of Energy in Gore's Senate Bill S. 1067(National High-Performance Computer Technology Act of 1989, 1989).

This bill still identified government, industry, and education as the primary groups needing access, but did include "other" groups. The Secretary would establish an interagency task force for High-Performance Computing to develop the strategy, use, and coordination among federal agencies and other participants (Department of Energy High-Performance Computing Act, 1989). Important to note is that this bill also stipulated that the network to be created would eventually "be eliminated or sold to the private sector when no longer needed" (Department of Energy High-Performance Computing Act, 1989).

The Department of Energy's bill revealed the rivalry within the government amidst the discussion of interagency cooperation and collaboration with industry and higher education. This rivalry continued into the next session of Congress with the re-

introduction of the same bill, the Department of Energy High-Performance Computing Act of 1991 (1991). Leadership was the issue that was not resolved by consensus (Forbes, 1995, p. 406).

Gore chose NSF to establish and manage the proposed network, although other agencies such as NASA and other departments such as the Department of Defense certainly were identified with related duties. However, those opposed perceived NSF as inadequate because of size, expertise, lack of resources, and political power through Gore, since NSF fell under the jurisdiction of Gore's Senate Commerce Committee (Forbes 1995, p. 406).

This was made evident at a hearing before the Subcommittee on Energy Research and Development held on March 6, 1990. Senator Wendell H. Ford (KY) asked Dr. Siegfried S. Hecker, Director of the Los Alamos National Laboratory, about the management of the network. Before Siegfried reached his point that all interested parties needed to be involved, he clearly stated that the current national network (managed by NSF) is inadequately managed, with badly coordinated sub-networks in which no one is in charge (Subcommittee on Energy Research and Development, 1990, March 6, p. 178).

Another example of this rivalry was demonstrated in an interview with Gore that was published in *Information Quarterly* in 1989, and in a hearing testimony by Dr. Allan Bromley, Science Advisor to the President, a year later. Gore strongly believed that no single company had the interest or ability to make such an investment, and noted that the federal government needed to fund the information infrastructure. Like the U.S. interstate highway system of the 1950s, this infrastructure would not be created by market forces. He indicated that "libraries, rural schools and minority institutions and

vocational education would have access to the same national resources" (quoted in Forbes, 1995, p. 283-285).

On March 7, 1990, at a hearing before the Subcommittee on Science, Research, and Technology, Dr. Allan Bromley testified that the concept of the information superhighway—providing the computing power available across the Nation to any citizen, any home, any school, any small industry, as well as major industries—was not part of what is suggested in High Performance Computer Act of 1991 (H. R. 656-High Performance Computing Act of 1991, March 7, p. 39). Forbes (1995) notes that although Congress may have been ready to pass legislation for a high-performance computing program, ownership of this network, and consequently the infrastructure, was a hot issue, and not only between the Senate's Commerce and Energy Committees (pp. 406, 429-430).

Special Interest Groups

In addition to rivalry found internally within the Congress, Forbes notes that between 1985 and 1991 special interest groups began to participate in the discussion for a high-performance computing plan (Forbes, 1995, p. 313). James Emery of EDUCOM and Congressman Douglas Walgren (PA) believed that the national plan for high-performance computing required input from those special interest groups outside of government and intentionally solicited participation and input from them (Forbes, 1995, pp. 81-84, 171; Walgren, as cited in Cassel & Little, 1994, pp. 66-67).

Groups such as the professional associations in the fields of engineering, education, libraries, manufacturers of computers and supercomputers, and telecommunication companies, provided their input through testimony at congressional

hearings, and through papers, forums, and newspaper and magazine articles (Forbes, 1995, p. 170). A few examples of such groups were the Institute for Electrical and Electronics Engineers (IEEE), educational groups such as EDUCOM, an association promoting use of information technology in higher education institutions, ICEC, the Inter-University Consortium for Educational Computing. Other groups dealt with information delivery such as the American Library Association, the Library of Congress, the Information Industry Association whose membership comprised electronic publishers and online database providers. Finally, industry and manufacturing were also included as special interest groups that Congress liked hearing from, such as Cray Research, AT&T, MCI, Sprint, and IBM (Forbes, 1995, pp. 81-97, 170-188, 313-333).

Each group defined their position with regard to the proposed supercomputing program, and provided their opinions as to the federal government's role (Forbes, 1995, pp. 81-94). The engineering and information technology field was primarily concerned with technical issues of assessment and application of the program, and felt the government's role should concentrate on the assessment portion which comprises the design, development, testbeds, research components, as well as protocol standards, and providing security (Forbes, 1995, p. 178; Marshall, as cited in Cassel & Little, 1994, p. 67).

Industry and manufacturing were concerned with technical and trade issues, business opportunities, and emphasis on private sector involvement. AT&T wanted the federal government's role to concentrate on pre-competitive technologies that would then be transferred to industry (Forbes, 1995, pp. 178-179).

Higher education's priorities were creating the NREN, building information technical programs into their curricula, and linking their scholars via this computer network (Forbes, 1995, p. 317). Although each group had unique perspectives, Forbes notes that they all supported the high-performance computing program and the creation of a national computer network (Forbes, 1995, p. 182).

Many articles published during this time period reflect the varied perceptions regarding leadership and ownership of this network. Many advocated cooperation as well as financial support from federal government, university, and industry sources (Bloch, McAdams, van Houweling, Wulf, Council on Competitiveness, as cited in Cassel & Little, 1994, pp. 65, 67, 68, 68, 72). Some strongly believed in privatizing the network, eliminating government subsidies for commercialization (Savage & Anthes, as cited in Cassel & Little, 1994, p. 71). Others looked at using the Corporation for Public Broadcasting as a model for governance and structure with substantial federal investment (Witherspoon, as cited in Cassel & Little 1994, p. 75).

Regardless of the varied perceptions, Brownrigg and Fisher identified the substance of the discussion as two obvious tensions: whether the federal government will provide the nation with a network as a public good, or whether such a network will be sold, in terms of services, as a private good in a commercial market (Brownrigg, Fisher, as cited in Cassel & Little, 1994, pp. 71, 72).

Library Profession

The Library profession brought many years of experience to the discussion of building a computer network devoted to research and education. This profession addressed mechanisms of distributing and utilizing information in U.S. libraries long

before computers were invented. As early as 1876 library professionals discussed topics of cooperative programs such as Interlibrary Loan of materials "...to aid research by serious scholars," and standardization for centralized cataloging of library materials. In the late 1800s and early 1900s there were cooperative efforts to provide indexing of periodicals, and union lists, respectively, which consisted of a compilation of material holdings among several libraries (Scott, 1976).

During the time that the Department of Defense created ARPA and began its research on computers and computer networking, the library profession continued to improve on methods of distributing and utilizing information. The library profession lobbied Congress as early as the mid to late 1940s to build library services throughout the country, implement interlibrary cooperative projects, and use computer systems. Data processing not only impacted businesses, but also libraries, as punch card systems began to impact the format of bibliographic records (Markerson, 1976). In the late 1960s the Ohio State Library Center (OCLC) was created and served as a centralized database for library records. Participating libraries pooled existing the cataloging records, hence saving in time and labor of cataloging an item that had already been cataloged by another (Forbes, 1995, p. 148-149).

In the late 1970s the library profession proposed and discussed the creation of a national library and information network. They identified the major issues as financing, network structure and access (to include not only technical standards, but the freedom of speech), network governance (to include federal regulatory communication issues and the public interest), education, research and development in order to understand, utilize, and manage the technology (Galvin, 1979).

In the early 1980s libraries were building online catalogs, and by the late 1980s libraries were linking them to their internal computer networks (Forbes, 1995, p. 240). By 1988, a standard for computer information retrieval protocol was officially announced as Z39.50. This protocol provided the capability to search and retrieve information between two differently manufactured computer systems had the ability to interconnect with the Internet (Forbes, 1995, pp. 139, 240; Hinnebusch, 1991).

The library profession did not provide input to Congress on the High Performance Computing discussion until 1989. However, once involved, many in the profession provided testimony to congressional hearings, submitted statements, and proposed amendments to Congressional subcommittees regarding the National High-Performance Computing Act (1989) and the National High-Performance Computing Technology Act of 1990 (Henderson, 1990a, pp. 3-6; Henderson, 1990b, pp. 7-12; Parkhurst, 1990, pp. v-vii).

James Billington, the Librarian of Congress, testified to the Science, Technology, and Space Subcommittee on September 15, 1989. Billington emphasized that the National Research and Education Network (NREN) would make library materials available to a wide variety of users such as the educational, economic, as well as library and research communities. He strongly suggested that the Library of Congress should play a prominent role in the development of this infrastructure, especially in the discussion of network standards where libraries had established a lead role (National High-Performance Computer Technology Act, 1989, September 15, pp. 260, 262).

On January 10, 1990, the American Library Association passed a resolution endorsing the concept of the NREN and resolved to improve legislation to increase

opportunities for all types of libraries to participate in the network. Proposed amendments to National High Performance Computer Technology Act of 1989 were drafted by ALA, and presented and discussed with the Senate Science, Technology and Space Subcommittee on February 1, 1990. Most of the suggestions that strengthened library linkages to the network were incorporated into the bill's revision (Henderson, 1990b, p. 9).

The American Library Association's statement, submitted to the Congressional hearing on March 7, 1991, summarized the profession's position regarding the building of the NREN that incorporated a library presence. This presence was significant because this profession already had a network structure in place that provided access to all users, most of whom had no other institutional connection to the Internet. Moreover, because of their existing network structure, the libraries identified themselves as potential test beds of products for the mass marketplace that would lead to eventual privatization of the network mentioned in the proposed legislation (H. R. 656-High-Performance Computing Act of 1991, March 7, pp. 164-169).

The library profession stepped into the legislative discussion and brought with it varied experience in organizing information, establishing technical standards for computer networks, and establishing policies regarding access for all users. The key issues they brought to the discussion were open access to information, accessibility to all users, funding, commercialization, governance/policy-making, network management, intellectual property, privacy/data security, user training/education and technical standards (Parkhurst 1990, p. v). Many of these issues echoed earlier discussions, specifically governance and policy-making, network management, and education and

training; however, the library profession's contribution made the discussion evolve from a narrow focus of network access targeting three groups (federal government, higher education and research, and industry) to a broader focus of access for all citizens within reach of a public library.

Key Issues of the High Performance Computing Act of 1991

The High Performance Computing Act of 1991 was signed into law on December 9, 1991, and commerce was a key issue that topped the list in this legislative discussion. The economic lead of the supercomputing industry was the main purpose of the Act. All other issues such as network access for government, industry, and higher education, research and training in the science of supercomputing, technical standards for interoperability, security, and intellectual property were still part of what contributed to the economic concern. The call for a collaborative or cooperative effort among government, industry, and higher education in building a program and network were also constant. Yet even in the midst of calls for collaboration and cooperatives efforts, the issues of leadership, management, and ownership of the high performance computing program, and consequently the NREN, proved a struggle as is evident from not only the rivalry in Congress and among government agencies, but also the special interest groups who now participated in the discussion.

The Library profession introduced their voice into the discussion by emphasizing first the contribution they would make to the technical discussion on network policy. Given their experience with developing standards with their own electronic networking efforts, they believed their participation in this area essential, especially regarding linking libraries to the NREN. However, the library profession also brought concepts of open

access to information, as well as accessibility to the network for all users, not just those in government, higher education, and industry. They shared previously expressed concerns in areas such as intellectual property, security, privacy, and technical standards, but saw the issues of governance, policy-making, and network management as very important at this time.

Key Participants of the High Performance Computing Act of 1991

The key participants in the discussion for the High Performance Computing Act of 1991 carried over from the previous actions of 1983 and 1986. The continuing performers were the federal government offices and agencies such as the OSTP, NSF, and the Department of Energy. Senator Albert Gore, Jr., (TN), Representative Douglas Walgren (PA), and others in Congress continued their efforts to establish legislation to build a high-performance computing program and a national computer network.

The added element in this process was the special interest groups such as the library profession, computer companies, telecommunication companies, and technical professional associations. These groups broadened the concept of access to the federal government's agenda. Yet while most of these groups were in agreement that a high-performance computing program and national network be created, the issue of leadership, ownership, and management was still yet to reach any consensus. Table B2 in Appendix B provides a more detailed list of key participants in the discourse.

The resulting legislation incorporated some of what was identified by the special interest groups. Laws for intellectual property protection and national security were part of the goals stipulated for the program. However, access was still targeted for

researchers, educators, and students needing access to high performance computing systems maintained by entities affiliated with this project.

There was no language about access for all citizens in the legislation, and the NREN was to be created collaboratively among the federal government, industry, and research and education with the intention to foster industrial competition and privately operated high speed networks. The legislation essentially stipulated a program yet to be designed.

Telecommunications Act of 1996

Legislation

The Telecommunications Act of 1996 (1996) was passed on Feb 8, 1996, and was a result of previous efforts to amend or repeal some of the provisions of the Communications Act of 1934, in light of the advances that lead to the various new technologies. Technologies such as telecommunications, video, and computer were converging into a digital environment that allowed distribution of voice, data, and video across one communications channel (Gilroy, 1996). The purpose of this Act was to promote competition, reduce regulation, and encourage rapid deployment of new telecommunication technologies, and represents the first law to place the Internet in a regulatory environment under what is known as the Communications Decency Act (Telecommunications Act of 1996, opening statement, Title V). Notably, however, as the Telecommunications Act of 1996 worked to deregulate the telecommunications industry, no changes were made to the laws requiring the standard for broadcasting (either in television or radio) as being in the public interest, convenience, or necessity (Sec. 201:336, 203).

The technologies that were previously controlled separately through the Communications Act of 1934 were now restructured in the Telecommunications Act of 1996, supposedly with less regulatory control, under a single and comprehensive telecommunications policy. As the main goal of this law was to promote competition for the new technologies in the digital environment, it still intended to protect the public from exploiting business practices, indecent material distributed via computer networks, as well as other telecommunication devices, and through redefining the concept of universal service (Gilroy, 1996; Telecommunications Act of 1996, Sec. 502, 503, 507).

The stated duties of the telecommunication carriers required equipment interconnection with other telecommunication carriers, adherence to guidelines and standards for access by individuals with disabilities, and interconnectivity for access by the broadest number of users ensuring users and information providers could transmit and receive information between, and across, telecommunication networks (Telecommunications Act of 1996, Sec. 251). The Act also required the FCC to establish policies for the concept of universal service such as services at affordable rates, access to advanced telecommunication and information services to all regions of the nation, and access to advanced telecommunication services for schools, health care, and libraries (Telecommunications Act of 1996, Sec. 254). Schools and libraries were included in this concept of universal service, and provided special rates for these institutions compared to other parties (Telecommunications Act of 1996, Sec. 254).

The Communications Decency Act of 1996 (Telecommunications Act of 1996) comprises Title V of the Telecommunications Act of 1996. The term *Internet*, or more specifically interactive computer service, was added to Title V entitled *Obscenity and*

Violence that already included the telephone and cable television services (Sec. 502, 507). Title V provided for fines, imprisonment, or both, for individuals who knowingly initiate transmissions, or allow transmissions to be initiated under his/her control of a facility that are directed to, or make available to, persons under the age of 18 that displays any offensive material—material that is obscene, lewd, lascivious, filthy, or indecent, or of a sexual nature. Transmissions can be in the form of comments, requests, suggestions, proposals, images, or other communication (Sec. 502).

Congress outlined the policy of the United States in section 509 of Title V. On the one hand the goal of U.S. policy promoted the development of the Internet, intended to preserve the competitive free market for the Internet, and encouraged technology development providing users with control over what information is received. However, policy also indicated that the U.S. planned to remain open to development of blocking and filtering technologies that provided control to parents, and ensure enforcement of federal criminal laws regarding obscenity, stalking, and harassment by means of a computer (Sec. 509). However, both the U.S. District Court and the U.S. Supreme Court struck down the Communications Decency Act of 1996 as unconstitutional in 1996 and 1997 respectively (Creech, 2003, p. 68).

Steps Leading to the Telecommunications Act of 1996

The process of this legislation began after the High Performance Computing Act of 1991 became law. Three things were happening concurrently: Congress and the Administration were making an effort to gather input from potential users of the National Research and Education Network (NREN); a National Information Infrastructure Task Force and Advisory Council were created to propose policy in deploying a national

information infrastructure; and Congress took action to revise the Communications Act of 1934 in order to re-structure the regulatory framework for competition in a digital marketplace. The discussion in Congress devolved from proposed legislation about the NREN, to the National Information Infrastructure (NII), and finally to deregulation of the telecommunications industry.

NREN Workshop

In September 1992, Congress held a workshop that included representatives from higher education, the library community, K-12, industry, non-profit foundations, and network providers (Institute for Electrical, and Electronic Engineers, Interuniversity Communications Council, Computing Research Association, 1992, p. i). The resulting report provided Congress, federal agencies, and other bodies with a policy role, and a context and reference to the development of this National Research and Education Network (p. i).

Congress sought input on six issues from the workshop participants: 1) mechanisms for funding the network, 2) evolution of the network, 3) charging Internet service providers (ISPs) for access, 4) technical feasibility for ISP access/use, 5) copyright protection, and 6) security of resources and user privacy (p. i). Eighteen of the participating organizations submitted position papers that addressed, in addition to the questions listed above, a suggestion for a historical model for NREN development (p. 7). This report is very telling of the varied perspectives that existed to the many stakeholders that strove for a voice in the discussion, and the degree of complexity that Congress had before them regarding the creation of a network to accommodate all these stakeholders.

For example, the American Library Association (ALA) saw NREN as a system of interconnected networks that would incorporate all library types as the NREN access points, libraries as network information providers, and with equity of access for everyone, not just the federal government, higher education, and industry (pp. A9-A10). The ALA wanted a voice in developing network policies and technical standards, as well as continued federal support and provisions for low cost predictable access to the network for all libraries.

The Association of College and Research Libraries (ACRL) wanted the network available to users in homes, offices, schools, libraries, research laboratories, and government assembly rooms. Furthermore, they believed the NREN should be publicly funded and regulated with a governing board that was bi-partisan and independent (p. A11).

However, commercial companies envisioned another picture. AT&T saw the evolution of the NREN as free market that served the national interests. Sprint saw an entrepreneurial environment in which the government would purchase commercial network services, not provide them, and expected an industrial policy initiative (e.g., supporting private sector enterprise) (pp. A27, A47, A215).

The position papers from the workshop provided suggestions for historical models for managing such a network that were just as varied. Models suggested were the U.S. Postal System, the Corporation for Public Broadcasting, distribution systems for Natural Gas or the National Power Grid, transportation systems such as highways, airlines, trains, and buses, the Agricultural Extension Service, and the Tennessee Valley Authority. Congressional Acts were also mentioned as models, including the

Communications Act of 1934, as well as Acts that provided federal support for building the academic libraries and providing availability of government information in the public library systems such as the Morrill Act and the Federal Depository Act (pp. 10-11).

Leading Opinions

What the network was going to be, and how it would function, was still perceived differently, as is evident from opinions of five leading experts from libraries, government agencies, and non-profit organizations involved in the legislative discussion on NREN as summarized by Elliott (1994). Among the many issues were the technical aspects of protocol compatability, but also funding, equity of access, privatization of the network, and the roles of libraries (Elliott, 1994, p. 239).

Peter Young of the National Commission on Libraries and Information Sciences (NCLIS) identified three groups that were competing for a voice in deciding policy for the network: the federal sector, the academic sector, and the private sector. He feared libraries would be left out of the federal networking plan and that academia should join libraries in being the point that connected the network to every home in America. Young viewed the role of libraries continuing as a face-to-face activity that built relationships in a changing environment (Elliott, 1994, pp. 244, 255-257).

Carol Henderson of the American Library Association (ALA) addressed the fact that libraries had been involved with the discussion on policy since the High Performance Computing Act of 1991 was introduced. She believed Congress recognized that libraries were moving from an entity that provided services from a specific physical space to providing services to users no matter their location. Acts such as the Higher Education Act and the Library Services and Construction Act were written to include technological

innovation for libraries. Henderson saw the federal government's role as making access affordable for not only libraries, but other groups dependent on telecommunication services (Elliott, 1994, pp. 246-247, 253). She realized that privatization was a foregone conclusion as policy, and felt the issue was to put forth efforts to assure publicly funded institutions' ability to benefit from technological advances (Elliott, 1994, p. 254).

Joan Lippincott of the Coalition for Networked Information (CNI) worked to educate and discuss network developments of the NREN to its 180 members who comprise institutions and organizations in research and education, as well as representatives from corporations. CNI assisted libraries in developing strategies to provide everyone with access to the network. Consequently, Lippincott expressed concern about the use of the network being reserved for advanced scientific research. She believed this narrow focus of users cheated others (Elliott, 1994, p. 253). Other concerns expressed by Lippincott were not so much with the concept of privatization as with the direction in which it was headed. Who would pay for access, how users would be charged, and how networks would be managed by the private and federal sectors was unclear (Elliott, 1994, pp. 252-255).

David Lytel of the Office of Science and Technology Policy (OSTP), and Daniel VanBelleghem of the National Science Foundation (NSF) saw the roles of their respective government agencies as providing access to the network through a combination of providing the technical framework and funding for access to the network, as well as enlisting and training users in libraries and education (Elliott, 1994, pp. 245, 249, 251). VanBelleghem did not perceive privatization of the network as a problem. He believed competition would lower the price to users (Elliott, 1994, p. 255).

Executive Order

In September of 1993, President Clinton created the U.S. Advisory Council on the National Information Infrastructure (NII) by Executive Order No. 12864 (1993). The Secretary of Commerce appointed members whose function it was to advise the Secretary on a national strategy for promoting and developing the National Information Infrastructure. The Council's charge was to address issues regarding the evolving nature of the National Information Infrastructure such as private and public sector roles, public and commercial applications, and regulatory impacts.

National strategies were part of this Council's discussion that included applications in electronic commerce, manufacturing, health care, government services, civic networking and life-long learning, as well as international issues. There were also technical issues of interconnection and interoperability, security that applied to the nation, individual privacy, computer systems and networks, and finally universal access and copyright (Executive Order No. 12864, 1993; Brown, 1993).

At the same time that the Council on the National Information Infrastructure was created, the Secretary of Commerce issued the publication *National Information Infrastructure: Agenda for Action* (Brown, 1993) and became chairperson of an inter-agency Information Infrastructure Task Force (p. 7). The *Agenda for Action* stated clearly that "the private sector will lead the deployment of the NII" (p. 6). The government's role regarding the infrastructure was to compliment the leadership of the private sector, and promote tax and regulatory policies that encourage private sector innovation (p. 6).

Although partnerships with business, labor, academic, and the public were viewed as vital, in 1993, Congress stated that they did not expect the federal government to "own, manage, or deploy the information infrastructure" (139 Cong. Rec. H1757, July 26, 1993, p. 16943). The private sector would have the responsibility to own, deploy and maintain the operation (139 Cong. Rec. H1757, July 26, 1993, p. 16943). Nine principals and goals were identified in the *Agenda for Action*. The federal government was to complement the private sector leadership through promotion of private sector investment, universal service, assisting the private sector develop technologies, making the network interactive, reliable, and secure, intellectual property protection, improve management of radio frequency in anticipation of digital wireless technology development, coordinate with government agencies regarding regulatory policy and provide access to federal government information across this National Information Infrastructure (pp. 6-7).

In January of 1996 the Council on the NII submitted its first report to the Secretary of Commerce and echoed the issues of the *Agenda for Action*. The report described the elements and functions of the NII, outlined vision and goals as well as major policy issues, and developed principles for the government. The users, information available through the infrastructure, and the technology that makes up the infrastructure described the elements and functions of the NII.

The federal government and the private sector roles were sharply defined. The private sector's responsibility was to design, deploy, and operate the Information Superhighway, while the federal government's role was to stimulate the development of this Information Superhighway. The federal government needed to create a public policy

and regulatory climate that included major issues of universal access and services, privacy and security, intellectual property protection, electronic commerce, lifelong learning, emergency management and public safety, health, and federal government information and services. Even though the roles for the federal government and the private sector were distinctly defined, the Council stressed cooperation and responsibility among corporate, federal government and private individuals, for building the NII, and making it affordable and ubiquitous (U.S. Advisory Council on the NII, 1994-1996; U.S. Advisory Council on the NII, 1996, January).

National Research Council Workshop

The National Research Council, a private, non-profit institution that provides the federal government with advice in the areas of science, technology and health policy under a congressional charter, convened a workshop in October of 1993 to address issues of technology and policy and the changes in U.S. telecommunications/information infrastructure since the break-up of AT&T in the early 1980s (The National Research Council, 2003; National Research Council 1995, p. iii). Representatives from academia and telecommunication corporations were present, as well as computer hardware and software manufacturers (National Research Council, 1995, pp. iii-iv). The workshop participants noted that the distinction between communications and computations were blurring, and that the country was moving away from an infrastructure defined by suppliers to one defined directly by the users. These issues covered the evolution of the telecommunications infrastructure, regulation for that infrastructure, the roles of health care, K-12, and libraries in this infrastructure, and public investment (National Research Council, 1995, p. 1).

What the workshop participants recognized was that the telecommunications/ information infrastructure had already moved through two stages of government regulation (regulation and deregulation). Now a third stage of regulation needed to be formed. The first stage of regulation was needed because of scarce resources, and the second stage of deregulation saw the AT&T breakup, abundant resources, competition, and decentralization. The third stage was to find the consumer, or receiver of information, take on more responsibility, choice, and control, thus requiring less regulation at the production and distribution end of information. As a consequence discussion was needed to address societal values such as equity, efficiency, and liberty (i.e., freedom of speech, right to privacy, autonomy, and right to own property), as well as community and participatory access (National Research Council, 1995, pp. 2-3; Firestone, 1995, pp. 34-62).

Most workshop participants agreed for regulatory restraint, but disagreed on how to accomplish such restraint in practice. The different perspectives revealed positions calling for regulation to protect consumers and competitors from monopoly power, seeking less regulation as well as different regulation, and viewing deregulation as worse than the status quo (National Research Council, 1995, p. 6). The key issues perceived for government regulatory action were that the federal government should not build the national information infrastructure; rather it should create conditions to promote private sector investment.

Regulation was perceived as impeding the adoption of innovative technologies, and deregulation of the past two decades were considered healthy for the industry and should continue. Universal service was considered a long term goal that must assist the

infrastructure's achievement of critical mass and profitability. Yet problems such as access by individuals with low incomes, access in rural areas, and the future of libraries were also voiced (National Research Council, 1995, pp. 16-17).

Clifford A. Lynch (1995), a panelist in the National Research Council's workshop who represented the library profession, identified and scrutinized some popular, yet conflicting assumptions about libraries and the National Information Infrastructure (NII). These assumptions included universal service being synonymous with universal connectivity; the public's access to free information; expanding libraries roles as key providers; and benefits that libraries would realize from the NII, such as reduced geographical inequities, improved quality of service nationwide, and relief from budget crises.

Lynch did not see universal access meaning the same thing as universal connectivity. Outside of libraries most all other information providers are profit oriented, and what was not addressed were the opportunities and economic terms that universal connectivity would provide (pp. 87-88). He emphasized that the problems with access to free information lies in what society is trying to accomplish through public policy. Beliefs that citizens would have rights to freely access a wide range of information conflicted with the fact that commercial information providers were not libraries. Commercial information providers charge for access to information, and if demand for that information is not present, they remove it (p. 95)

Even though networking provides opportunities to overcome geographic challenges, purchasing information in electronic form involves licensing that comes with restrictions that limit access to a specific library's constituency; consequently, the

geographic challenge remains. Libraries have historically provided information materials to their users at no charge; however, libraries still require funding to purchase those materials, and public libraries, especially, have suffered from budgets cuts nationwide. Without subsidies to libraries the goals of the NII may be difficult to achieve. In addition to the commerce related issues, societal and legal structures addressing ownership of, and access to, information resources need attention (Lynch, 1995, pp. 86-97). Lynch also stressed the importance of evaluating the societal and legal structure of information ownership and access because society will be challenged "to define a base level of information resources that we believe must be available to all members of our society, regardless of the ability to pay" (pp. 86, 89).

In addition to the NREN and NRC workshops mentioned above, there were many other efforts on part of newly formed groups, too numerous to mention here that examined the issues and took a stand regarding policy for the NII. These groups produced democratic dialogue on a large scale, and, according to Drake (1995) made an impact on the process of public policy.

One such group formed in October of 1993 as the Telecommunications Policy Roundtable. Many organizations comprised this roundtable: professional library associations, unions, coalitions, and civic groups that focused upon the public interest issues. The American Library Association, the Benton Foundation, the ACLU, as well as the National Association for the Deaf, and the Electronic Frontier Foundation were among these organizations. This Telecommunications Policy Roundtable provided Congress with principles for the National Information Infrastructure. These principles were universal service, freedom of speech, competitive marketplace, equitable

workplace, privacy protection, democratic participation, and policymaking with an electronic civic sector through which all of society could participate (Drake, 1995, pp. 322-324; Telecommunication Policy Roundtable, 1993).

Congressional Action

In 1992 and 1993 bills were submitted for expanding federal efforts to develop technologies for high performance computing and for building and implementing a national information infrastructure. In July and August of 1992, Senator Albert Gore, Jr., (TN) and Representative George Brown, (CA) submitted identical bills each known as the Information Infrastructure Act of 1992 (S. 2937, 1992; H. R. 5759, 1992). These bills started the process for developing applications for high performance computing, high-speed networking, and forward movement on an implementation plan for a National Information Infrastructure program.

The two identical bills identified the development of network applications for education including pilot projects connecting primary and secondary schools to the Internet and the NREN; creating advanced data storage systems and digital library prototypes; and technology development for healthcare, manufacturing and other areas. The Director of the OSTP and the FCCSET were charged with establishing the information infrastructure program and a five-year implementation plan to develop the technologies mentioned above (Information Infrastructure and Technology Act of 1992, July 1 and August 4). Both bills amended the National Science and Technology Policy, Organization, and Priorities Act of 1976, and were referred to respective committees in the Senate and the House, but never saw debate, and were not reported out of committee.

In January and February 1993, Senator Ernest Hollings (SC) and Representative Tim Valentine (NC) submitted bills focused upon industrial competitiveness and economic growth in the United States. Both bills were each entitled the Competitiveness Bill, and included the Information Infrastructure and Technology Act of 1992 as a separate section in each (S. 4, 1993; H. R. 820, 1993). House bill H. R. 820, the House equivalent further expanded the text to include revising judicial process for regulatory review. Additional bills were submitted throughout 1993, 1994, and 1995 that were single focused topics of encryption for the public welfare and national security, protecting children from pornography dissemination by computers, protection against computer fraud, unauthorized access, extortion, and copyright.

However, what started out as legislation to deploy the National Information Infrastructure in the age of convergence, as well as address single issues regarding computer behavior, resulted in Congress re-writing regulations focused on promoting competition and reducing regulations for the telecommunications industry. It was the digital environment's need for telecommunication services, and the realization that the existing regulations were obsolete to accommodate such an environment that prompted regulatory review (H. R. 5199, 1994; S. 892, 1995; S. Rep. No. 103-367, 1994, p. 1,15; S. 1822, 1994; S. 982, 1995; S. 1284, 1995; S. 473, 1993; H. R. 2441, 1995; S. Rep. No. 104-23, pp. 9-10).

Drake (1995) notes that during this time, corporate stakeholders took action in many ways while anticipating Congress' attempt to overhaul the Communications Act of 1934. Alliances and mergers were taking place between telecommunication, cable and wireless service companies, as well as manufacturers, information service providers, and

software companies. Their goal was to establish a position for the anticipated market surrounding the NII, and lobby the federal government, arguing for more incentives and revenue opportunities, and pressing to limit, or eliminate, the public interest protections (pp. 313-314).

Even though deployment of National Information Infrastructure (NII) was mentioned in these bills, sometimes as "the future system of networks, computers, and databases expected to revolutionize the way citizens communicate with, and serve, the American public," the primary issues raised in this regulation review were removing barriers to competition and protecting the public interest (S. Rep. No. 103-367, 1994, p.15; Gilroy, 1996, pp. 93-298). The senate reports consistently stated that the purpose of these bills was to not only create a National Information Infrastructure and develop technologies for it, but to promote industrial competitiveness, commercialize these technologies without increasing regulation to the private sector (H. R. Rep. No. 103-173; 1993; S. Rep. No. 103-113, 1993; S. Rep. No. 103-69; 1993; S. Rep. No. 103-367, 1994).

These bills discussed aspects of competition such as local control, long distance, cross ownership of different businesses, information services and electronic publishing, manufacturing and equipment, and broadcasting (Gilroy, 1996). The goal was to somehow replace the old models for communications in preparation of deploying a different type of network and a new generation of services (Drake, 1995, pp. 314-319; Gilroy, 1996).

Some perceived the resulting legislation of the Telecommunications Act of 1996 as still containing too much regulation, and that it did not stimulate competition. Others wanted to have the process of deregulation transition gradually toward competition

(Gilroy, 1996). Drake (1995) believed the discussion provided more freedom for large commercial companies and less protection of the public interest in terms of creating a fair and competitive market (p. 342). However, a year after the Telecommunications Act of 1996 was enacted, even former Senator Larry Pressler (SD) stated that the impact from the law is still occuring, and that no one knows exactly how the telecommunications industry will change in the future (Ohnemus, 1997).

Commercialization

In April of 1995 commercialization of the Internet was made official when the National Science Foundation (NSF) took steps to hand over the operation of the NSFnet to the private sector. NSF's preparation took close to two years and accomplished the task by privatizing sections of the network operations so as not to create a commercial monopoly. When this conversion to the private sector was complete the federal government would no longer support the electronic highway (Lawler, 1995; Rowland, 1999, p. 317).

Communications Decency Act

No matter how the discussion resulted on the telecommunications regulatory structure, Title V, the Communications Decency Act of 1996 (CDA), brought the issue of freedom of speech to the forefront of the policy discussion. The arguments against the legislation existed in Congress, in the press, throughout the Internet community, among groups such as the ACLU, and the library profession. According to Creech (2003) this section of the law applied indecency standards to the Internet, similar to those standards which apply to broadcasting (p. 68). However, this topic was not new in Congress. Similar provisions were written and introduced by Senator Jim Exon (NE) in 1994 and

1995 (S. 1822, 1994; S. 314, 1995; Drake 1995, p. 336), Representative Burton in 1995 (Gilroy, 1996), Senator Charles Grassley (KS) in 1995 (S. 892, 1995), and eventually made its way into the Telecommunications Act of 1996.

Grassley and Exon wanted regulation to protect minors from pornographic material over computers and the Internet in the same manner as the telephone and radio broadcasting. They wanted to fill the regulatory gaps in the regulation that the new technology created. Pornography had traditionally been a concern at the local level, but now with global networks, Grassley believed Congress needed to take a role in protecting children (141 Cong. Rec. S. 892, June 7, 1995, p. S7923; Exon, 1995, March 9, March 13).

Senator Patrick Leahy (VT) believed the responsibility to protect minors from objectionable material found on the Internet rested with parents; consequently, he was a proponent of blocking technology for computers. He stated that the Internet was not like broadcasting or newspapers where station managers or newspaper editors decide what is broadcast in radio or print. Leahy described the Internet as a combination of a library and a town square that provided availability to vast amounts of information, or provided opportunity for free and open discussions, respectively (141 Cong. Rec. 1995, July 31, p. S10485).

An editorial from *The Washington Post* agreed with Leahy, and pointed out the attempt to model this legislation on older laws regulating print and broadcasting (Censoring Cyberspace, 1995). An editorial from the *New York Times* described the problem that the term *indecency* was too broad a category to define and that this portion of the telecommunications bill "deserves oblivion" (Censorship on the Internet, 1995).

The ACLU filed suit the day the bill was signed into law to challenge the CDA's constitutionality. The ALA filed suit later on February 26, 1996 as the lead plaintiff in a coalition of corporate and public interest groups that included America Online, American Booksellers Association, the American Society of Newspaper Editors, and Apple Computer to name only a few (Creech, 2003, p. 68; ALA Led Coalition, 1996, April, p. 13-14). The Internet community protested the creation of the law by having web pages go black across the Internet (St. Lifer & Rogers, 1996, March 1, p. 15).

The counsel for the ALA led coalition wanted to persuade the court the difference between the Internet and television and cable. This counsel believed the law was overbroad, vague, and unnecessary as responsibility for blocking unwanted material on the Internet lay with the user, not the provider (ALA Led Coalition: 1996, pp. 13-14). Judith Krug, with the ALA's Office for Intellectual Freedom was not surprised at the legislation. Krug stated that libraries' history with the conflict between indecency and freedom of speech was nothing new; libraries battled with these concepts in past decades in the medium of print, and so too with telecommunications (ALA Led Coalition, 1996, p. 14).

Other issues were raised as the result of the inclusion of the Communications Decency Act of 1996. This act brought the issues of not only liability for librarians, but intellectual freedom and censorship to the forefront of the policy and regulatory discussion (Pinnell-Stephens, 1996, pp. 37-38; Koenig, 1996, p. 40). Koenig (1996) makes an important observation that two events that were occuring simultaneously: while Congress promoted deregulation of the telecommunications industry Congress was also promoting regulation for the Internet (p. 41).

Library Profession

The library profession was involved in providing a voice to the discussion of how a national computer network would exist and function, and who would have access to it since the High Performance Computing Act of 1991 was passed. In addition to their input at congressional hearings, this profession made this discussion a key component of their own professional activities, and continued their involvement in this discussion through to the passage of the Telecommunications Act of 1996.

Initially, the library profession wanted a specific voice in determining technical standards and governance policy; however, this profession later concentrated to assure not only access for all citizens, but access that would be equitable and affordable. Andrew Blau, Director of the Benton Foundation, advised librarians to concentrate their efforts on the subject of universal service because "they are the experts in issues of access and equity" (St. Lifer, 1996, March 15, pp. 30-31). Blau essentially dismissed librarians' experience at organizing information systems and addressing standards for electronic networks. He advised librarians to focus on applying their experience to the discussion regarding rules about preferred/discounted rates to be determined by the FCC, assuring that telecommunication services will be universally available (St. Lifer, 1996, March 15, p. 31).

The ALA's response to the Communications Decency Act was described as tepid by St. Lifer and Rogers (1996, March 1, p. 14). While the ACLU filed suit on the day the act was signed into law (February 8) the ALA chose to focus on the accomplishment of preferred and discounted telecommunications rates for schools, libraries, and rural healthcare providers, which was still yet to be determined by the FCC. However, in

February 1996, the libraries continued the discussion after the Telecommunication Act became law. The American Library Association met in a summit meeting to define the public interest in the emerging information superhighway (Turock, 1996). Libraries were defined as the true information infrastructure that was based in democratic principles that served as an equalizing force providing information to all people (p. 2). Five principles were established from this summit that addressed protecting the public interest: universal access, privacy and security regarding personal records, balancing the protection of intellectual property with fair use, intellectual freedom, and equity of access (Turock, 1996, p. 3).

Yet, as some declared public libraries the heart of the delivery system, the institutional providers, and instruments of universal policy, others asked why libraries were not perceived as "the vehicle to convey information on the superhighway..." (Billington, 1996, p. 18; Henderson, Bradley, Magpantay, & Weingarten, 1996, p. 28; Black, 1996, p. 49). Black answered this question by pointing out that the goal of commerce on the information highway took precedence over the concept of equal access for all people for which the library profession consistently strove (Black, 1996, p. 49).

Key Issues of the Telecommunications Act of 1996

Congress took the initiative to discover the key issues in this legislative process. Soon after the High Performance Computer Act of 1991 became law Congress sought to understand the perspectives of those outside of the federal government to try and answer questions regarding how the proposed National Research and Education Network (NREN) would evolve. The primary questions Congress sought to answer were: 1) What the network would evolve to be, 2) Who would fund the network, 3) who would access

the network, and 4) who would own and manage the network—the public or private sector, and 5) what historical model would serve as an example of ownership and management of such a network.

From these discussions emerged issues of intellectual property protection and copyright, privacy and security for individuals and resources respectively, and public ownership/leadership vs. private ownership/leadership. Access was broadened beyond merely the federal government, higher education and research, and industry to all citizens. Although intellectual freedom/freedom of speech and censorship were mentioned early in the process, attention to these issues came to the forefront with the Communications Decency Act. Significantly, while most in Congress worked to deregulate the telecommunications industry in order to reform an out-dated regulatory structure due to the demands of new technology, others worked to make the new technology fit within the existing regulatory constraints regarding obscenity and violence.

The library profession gradually moved away from their stance on being an integral part of the technical discussion on construction of the network and its policy and standards, to that of focusing on equity of access for all citizens, privacy and security of personal records, intellectual freedom, and balancing intellectual property protection with fair use. Libraries were included in the language of the bills, but libraries were not identified as part of the management of the infrastructure. They were merely recipients of support for being a part of that infrastructure.

Even through Congress solicited opinions and perspectives from those outside the federal government, from the start of this process, Congress still had a central focus of

commerce surrounding all the proposed legislation. The Executive Order of 1993, and its subsequent publication *Agenda for Action* directly stated that the NII would be deployed and managed by the private or commercial sector. The purposes listed for most of the legislation submitted for the NREN, and subsequently the NII, was for industrial competitiveness, economic growth, regulatory review and reform, and ultimately deregulation. The federal government eventually turned over the management of the Internet to the private or commercial sector, and the resulting legislation primarily addressed the telecommunication industry.

Key Participants of the Telecommunications Act of 1996

The key participants of this legislative process still largely comprised government, higher education, and industry. However, the library profession continued to contribute to the discussion, and were joined by other professional associations, non-profit, and consumer advocate associations. Some individuals in the federal government were repeat performers from the earliest legislative processes such as Robert Kahn, formerly of DARPA, Fred Weingarten, originally with the Office of Technology Assessment, later with the computing Research Association, and also Senior Policy Fellow with the ALA's Washington Office. Kenneth Kin and Michael Robert with EDUCOM also added continuity from previous legislative activities. Table B2 in Appendix B lists key participants involved in workshops, councils, congressional hearings, or published papers on the subjects.

Analysis of Internet Regulation Discussion

The discussion for regulating the Internet marked its beginning in 1983, shortly before the OSTP was to conduct and present to Congress the results of the Computer

Network Study in 1986/1987, and continued through the Legislative and Executive actions of 1991, 1993, and 1996. While this discussion gradually evolved to include access for a broader constituency of users, it maintained the key issue of commerce, related first to the supercomputing industry with the High Performance Computing Act of 1991, and ultimately, to the deregulation of the telecommunications industry with the Telecommunications Act of 1996.

The federal government began the discussion when the OSTP examined the emerging issues in the computer industry in 1983. Three broad concerns remained a common thread and focus, from their point of view, and these concerns persisted from 1983 to the enactment of the Telecommunications Act of 1996. These concerns were 1) industrial competitiveness, 2) maintaining the U.S. economic lead of the supercomputing industry, and 3) concern for telecommunications regulatory review for the advantage of the private, or commercial, sector.

Other issues were included in this discussion, persisted from the beginning, and were considered no less important such as the need for technical standards for interoperability, security, the protection of intellectual freedom, intellectual property protection (and/or copyright), funding, and access. A collaborative effort to build and manage such a computer network was called for among the federal government, the scientific community, and the computer and telecommunications industry. Boosting education in science and engineering was discussed, along with improving interagency coordination within the federal government.

However, the issues evolved from a discussion focused on users internal to the federal government's work in computer network research that would eventually transfer

the technology to industry, to users which included the general public that would have access to the network through schools, libraries, and eventually their homes. Special interest groups, such as the library profession, brought the issue of including access for the general public to Congress' attention.

Congress turned out to be a willing body that supported legislation for high performance computing. After all, the effort to be made was in favor of supporting commerce as well as national security. Since 1985, Congress wanted to examine the short and long term needs of scientific computing. What proved to be difficult were the issues over ownership, management, and leadership of the computer network. These issues produced tensions among the federal government agencies, within Congress, and later with special interest groups.

While most in Congress supported the idea of a high-performance computing program, proposed bills varied in detail on who would manage the program, and build and own the computer network There were struggles over whether the NSF or the Department of Energy would serve as managers of the network. Gore wanted the network to be created and managed by the federal government as was the Interstate Highway system. Others, like Walgren, Brown, and the Department of Energy wanted the federal government to create the network, but eventually pictured ownership to be turned over to the private/commercial sector.

The High Performance Computing Act of 1991 resulted in the NSF as manager of what became known as the National Research and Education Network (NREN), and eventually the National Information Infrastructure (NII); however, Gore could not escape the pressure of eventual ownership by the private sector. In 1991, the legislation stated

that the NREN would be designed, developed, and operated collaboratively by the federal government, industry, and research and education. By 1993, the Administration made it clear by Executive Order, and subsequently, the *Agenda for Action*, that the government's role was to only complement the leadership of the private/commercial sector. The private/commercial sector would own, deploy and manage the NII, and the federal government would examine the regulatory structure to encourage private sector innovation in this area. Eventually, the network was turned over to the private sector in 1995.

Congress actively sought other opinions regarding the subject of supercomputing and computer networks from those in federal government, as well as those outside of the federal government such as non-profit, commercial, public and education groups. Indeed, Congress noted many of the issues in the Senate and House reports. For example, it was the mentioning of the issue of extending the access to such a computer network beyond merely the federal government, higher education, and industry that redefined universal service. Moreover, other issues were also mentioned such as intellectual freedom, intellectual property protection, and security.

The groups outside the federal government also agreed that collaboration among the federal government, higher education, the private/commercial sector, and the public was necessary to make the NII function. Still, opinions over funding, ownership, and regulation varied. Some believed regulation necessary, some thought it excessive, and some argued that the emerging digital environment now called for a different regulation, one more uniquely suited to the new type of communication structure that was evolving.

Ultimately, however, Congress realized, in light of the changing telecommunications environment, that regulations within the Communications Act of 1934 were outdated and could not apply to this new digital environment. What Congress addressed in the Telecommunications Act of 1996 did indeed fall back to the three main concerns of industrial competitiveness, maintaining the U.S. economic lead (now in telecommunication technologies), and telecommunications regulation. After all, the stated purpose of the 1996 act was to promote competition, reduce regulation, and encourage rapid deployment of new telecommunication technologies.

Gone from the Telecommunications Act of 1996 were issues drawn from the workshops, congressional hearings, and written papers that specifically addressed intellectual freedom, intellectual property (or copyright) as they would or should apply to the NII. As a result, all other acts specifically addressing the NII were supplanted by the Telecommunications Act of 1996. The NII became the Internet, and that was now managed by the private/commercial sector. The act was written for the private/commercial sector. Deregulation of telecommunication laws now provided opportunities for the private sector to advance the technologies and services for this medium.

However, the Telecommunications Act of 1996 did not revise the entire Communications Act of 1934. Public interest, convenience, and necessity remained as a standard for both radio and television broadcasting, and rules for obscenity and violence in broadcasting remained in place as well. In fact it was the Communications Decency Act of 1996 that updated the rules for obscenity and violence to specifically include the

Internet. This was the only piece of the Telecommunications Act of 1996 that addressed the Internet specifically as a new medium of communications.

The Library profession evolved from wanting to serve as the physical infrastructure of the network, and having a significant voice in the making of the technical standards and network policies, to that of placing a greater emphasis on providing affordable rates for network connectivity for schools, libraries, and other public institutions, as well as emphasizing the importance of access to all citizens. Librarians worked to involve themselves in the legislative process because they knew they possessed a history of experience in networking information, and lobbying Congress for support. They participated in congressional hearings, submitted papers in workshops, held forums to identify and clarify important issues for the information infrastructure, and filed suit to champion the cause to maintain freedom of speech for the Internet.

This profession initially presented themselves as the potential information providers for the infrastructure in a technical capacity, as a testbed for commercial mass markets, and as a social environment. They believed their experience would be valuable in the discussions of governance and policy-making. However, librarians entered the discussion relatively late in the process, and shared the scene with powerful lobbyists for computer manufacturers and telecommunications companies such as Cray Research, Thinking Machines, Inc., and AT&T. Although Congress included libraries with other public institutions for discounted rates for network connectivity and the concept of access for all citizens in the legislation, more attention was paid to the commerce of the telecommunications industry.

Identifying this discussion as one pertaining to regulation must be clarified. This discussion did not begin with the want, or need, to regulate the use of an already existing computer network. The discussion began in order to create a computer network, initially for the internal workings of federal government research, that included scientists and researchers in higher education, and industry. Regulation was one issue in the initial steps toward most of the proposed legislation, and this subject was to be examined as a sweeping consideration for the various businesses that provided telecommunications technology and services to the public. In addition, many wanted to clarify the regulatory roles of the federal government and the private/commercial sector.

The discussion of regulation went hand in hand with the discussion of the creation of the network itself. People needed to decide what the network would be and what regulation was needed. The primary concern surrounding regulation was to review the existing laws and historical models in anticipation of change that digital technology promised in the area of communication.

The sequence of legislation worked its way from an internal federal government discussion of building a national computer network for research and development, which focused on industrial competitiveness, and economic and regulatory concern, to a broader discussion of a national network that was owned and operated by the private/commercial sector which focused on promoting competition, reducing regulatory factors, and encouraging deployment of telecommunication technologies. By 1996, the legislation primarily addressed the Telecommunications Industry.

Comparison of Radio and Internet

This chapter will compare the path of the discussion of regulation for radio and the Internet through the comparison of the key participants and the key issues. A brief synopsis of the writings of James W. Carey, Ithiel de Sola Pool, and Lawrence Lessig will show the reason that commerce rests at the core of these regulating decisions. Finally, the Library profession's contribution to these discussions of regulation is addressed, and the extent to which this contribution reflected their mission. Three specific questions will be addressed: 1) Do the similarities of the discussion between radio and the Internet outweigh the differences?, 2) Does the history of early radio regulation prove an acceptable historical analogy in which to view the discussion of Internet regulation?, and 3) Are the participants of the Internet discussion in 1996 reaching the same conclusions reached in 1927 with Radio?

Key Participants

A parallel pattern of participation emerged from the two discussions, which is displayed in Table 1. First, the number of participants from the initial users comprised three groups at the beginning of each discussion. Two of those groups were associated with specific activity in which each media played a significant role: the federal government and the commercial and industrial players. The third group represented users who did not necessarily correspond across the time periods, but represented a part of the public who had use of the medium before the public masses had general access.

Radio grew from the maritime activity of the federal government and the various commercial companies. These participants battled to keep each other from technical interference and administrative meddling with their activities: national defense and

commerce respectively. The Internet grew from research activity within the federal government in which industry as well as higher education and research were a part. Unlike radio, Internet participants called for collaboration in building and using the computer network. However, the industry was clear in limiting the federal government's collaborative role to that of an investor, the entity to transfer technology to the private sector, and the one to foster a favorable regulatory climate for industry.

Later, new and varied organizations joined the discussion as the capability and application of these media became new and exciting tools that reached and became available to their public audiences. Some of these organizations were commercial, some non-profit, but all wanted network access to extend beyond the three primary groups whose efforts originated the system of communication.

Finally, commerce was a common aspect that was the focus of the various congressional committees. Nearly every bill proposed in both discussions was reviewed by a congressional committee addressing commerce (See Tables in Appendixes A and B). The difference was that the emphasis on commerce changed from maritime transportation and trade, during radio's period, to science, technology, transportation, and trade during the Internet's discussion.

During radio's time period the groups listed in Table 1 battled over access in the airwaves. Congress favored the position of the commercial companies by not instituting any regulation with authority until 1927, and only then because no technical solution had been discovered that would solve the interference problem. Congress was pressured, by

Table 1.

Comparison of Key Participants

Key Participants	RADIO	INTERNET
Initial Group	Federal Government Military (Navy)	Federal Government Depts., Agencies, Labs, Executive Office.
	Commercial Telegraph/Radio	Commercial Computer & SW Industry Commercial Telecomm Industry
	Amateur Operators	Higher Education: Science, Research Community
Later	Inst. Of Radio Engineers	Professional Engineering Assoc.
	Nat. Assoc. of Broadcasters	Library Profession
	Universities	Publishers
	Newspapers	High Schools
	ASCAP	Non-Profit Foundations
	ACLU	AFL-CIO
	Utility Departments	Utility Departments
Congressional Committees	Merchant Marine & Fisheries	Commerce, Science, & Transportation
	Interstate & Foreign Commerce	Commerce
	Commerce	Science, Space, & Technology
	Judiciary	Government Operations
	Naval Affairs	Government Affairs
	Public Law	Labor & Human Resources
	Patents	Judiciary
		Courts & Intellectual Property
		Technology & Competitiveness
		Energy & Natural Resources
		Telecommunications & Finance
		Commerce, Trade, and Hazardous Materials

none other than the Department of Commerce, whose mission was "developing new fields of trade and industry" since its creation (Bowers, 1995, introduction).

During the Internet discussion, the emphasis of science was combined with commerce, as emphasis was placed on technology transfer to industry. Even when funding for higher education was called for in the discussion's early years it was connected to commerce, as the industry anticipated a shortage of graduates educated in the science of computing.

Key Issues

The comparison of the key issues listed in Table 2 reveals similarities and differences. The first row of each column shows the prominent issue from each discussion that served as the primary arguments for discussing regulation. For radio, interference served as the primary argument for regulating use in the airwaves. In the same fashion, computer industry economics, and later, telecommunication industry economics served as a primary argument for involving the federal government in building a computer network and reviewing the regulatory structure in favor of industry. The remaining issues followed and became interrelated as each discussion unfolded. Radio's issue of intercommunication closely matches the Internet's issue of interoperability, though the difference lies in a behavioral aspect versus a technical aspect. In both instances, people were trying to set a standard in a network of communication for all users. For radio, people were trying to change a proprietary policy within the Marconi company that prevented messages being received from anything else but Marconi equipment. In the case of the Internet, interoperability called for open technical standards to make the communication network function without concerns over

proprietary hardware or software requirements. The transmissions needed to be able to flow through the network from many different computers using different software programs. In both cases, the issues were related to preventing monopoly of the flow of communication.

Regulatory authority concerns for radio corresponds to the Internet's issues of leadership, management, and ownership of the network. Each discussion began by including the issues of regulatory authority, and included battles over who would control the network, and what form this control would take. For radio's discussion, authority was necessary because of interference, and the key participants battled over patents, the allocation of space in the airwaves, and the management of the airwaves by a political appointee (Secretary of Commerce) through to the 1927 legislation. From the start of the Internet's discussion, the topic of regulation was also perceived as necessary. In this case, the matter dealt with reviewing existing laws to change the regulatory environment, to decide the roles the key participants would play in the regulatory structure, and the economic concern for the industry of computers and later telecommunications.

Monopoly was an issue of fear that was tied closely to regulatory issues. This fear existed with all the participants from both discussions and centered on the control of the flow of communications, and touched many other issues. There was fear that federal government control might suppress commercial competition, freedom of speech, or limit access by the public. Radio stations realized this when the federal government restricted speech in broadcasting (Hoover's declaration of free speech, yet control over unwholesomeness in the airwaves) and the licensing of applicants was judged on the basis of providing public interest, convenience, and necessity. This same fear of

restricting speech was also realized for the Internet in the form of the Communications Decency Act of 1996, in which computer communication was subject to broadcasting-like rules of obscenity and violence.

The federal government, and those outside the federal government, had concerns over protection for consumers, unfair competition among commercial companies themselves, such as price fixing, proprietary equipment requirements, and growing monopolistic power. Legislators from radio's discussion believed they solved the problem by specifying no licenses granted to those of unlawful monopoly practice. Legislators from the Internet's discussion believed they solved the monopoly problem not through regulation, but through technically partitioning the Internet's infrastructure among private telecommunications companies.

Licensing was different in that it was legislated for radio, but not for the Internet, though similar in terms of registering a place in the Internet. Anyone who wanted to either broadcast on radio, or to have a website in the information infrastructure must apply and register, respectively, in order to obtain a call letter and frequency in the case of radio, or a Uniform Resource Locator (URL) number in the case of the Internet. The difference rests in the fact that the act of licensing for radio was legislated and made a judgment for the public that owns the airwaves as to who and what would be broadcast. In the case of the Internet, the registration itself was not legislated, nor tied to any conditions for the public interest, convenience, or necessity, and was not part of the discussion.

Table 2.

Comparison of Key Issues

	RADIO	**INTERNET**
Prominent Issue	Interference	Computer Industry Economics
Issues that followed	Intercommunication	Build computer Network for Fed. Gov., Industry, Higher Educ/Research
	Regulatory Authority	Regulatory Review
	Monopoly	Interoperability & other technical standards
	Public Welfare/Public Interest	Intellectual Freedom/Freedom of Speech
	Property Rights	Leadership
	Licensing	Management of Network/Collaboration
	Freedom of Speech	Ownership of Network
	Copyright/Intellectual Property Protection	Security/Privacy
		Property Rights
		Equitable Access/Public Interest
		Copyright/Intellectual Property Protection

Finally, the issues of public welfare/public interest, property rights, copyright and intellectual property protection, and freedom of speech are the most obvious issues that mirror both time periods. In both time periods these issues represented the tension between liberty and protection under the U.S. Constitution's Fourth Amendment. Participants from both discussions re-examined, re-defined, and re-fit these issues to not only the new media, respective to each time period, but to make this process an ongoing task, as each medium, considered new and undefined, continued to evolve.

Throughout radio's discussion public interest evolved through different types of protection, namely national security, maritime safety, and the listening public. However, commercial wireless and radio companies, and the amateurs objected to such rationale. There were concerns over intellectual property such as patents, and legal issues of allocating space in the air, historically considered a free resource. Copyright protection was re-defined in terms of audience and performance when broadcasting appeared.

With the Internet, public interest was redefined, primarily by those participants outside the federal government, as protections of liberty for the citizen: universal and equitable access, freedom of speech, and property rights and fair use. Security and privacy were shared concerns with both the federal government as well as commercial and the special interest groups. Copyright was re-examined with the Internet as the convergence of multiple technologies occurred across digital communication.

The Writings of Carey, De Sola Pool, and Lessig and the Commonality of Commerce

The writings of Carey (1975; 1989), Pool (1983), and Lessig (1996, May; 1996 Summer; 1999) show respectively, how information was tied directly to the transportation infrastructure from the early years of the United States, how this

association named information as a commodity of commerce, and how the evolution of information technologies still have a connection with commerce that needs to be reconciled with law. These writings provide the framework for understanding how the decisions of early radio and Internet regulation were connected to commerce.

James W. Carey

James W. Carey, journalism professor with Columbia University, stated that there are two models of communication: 1) transmission, that is geographical (transportation), and 2) ritual, that is cultural. Both forms originated in religion with movements across space to spread the word of God (transmission), and in time for the construction and maintenance of an ordered culture (ritual) (Carey, 1975, pp.1-22).

The transmission model is a process that moves information between sender and receiver across a medium (road, canal, telecommunications channel). Ritual is the action of sharing and participation that produces an ordered and meaningful culture and community. Ritual is distinguished from transmission by ceremony or social interaction which confirm shared values and beliefs, rather than as a process of transportation. However, transmission and ritual serve each other as counterparts in that both models can simultaneously disseminate information (transmission) and create solidarity for community by the content of that transmission (ritual) (Carey, 1975; Lenert, 1998, pp. 3-23).

Carey indicated that the transmission model of communication, with its basis in transportation, has been the prominent model of communication in the United States since the 1920s and came to define communication as methods of politics and trade rather than as an exchange of ideas and experience (Carey 1975, pp. 20-21). This model

grew from Thomas Jefferson's efforts in the 19th century to establish a transportation infrastructure of roads and canals which served as channels of communication that would conquer distances and unify a new nation (Carey, 1989, p. 7). It was during this time that communication became associated with the movements of goods and people, and defined as commerce (Carey, 1975, p. 3).

Harry Frease (1934) of the U.S. Supreme Court provides examples of 19th century court decisions that defined this association of communication with transportation and commerce. The cases of Gibbons v. Ogden, Brown v. Maryland, Railroad Company v. Huson, and Pensacola Telegraph Co. v. Western Union Telegraph Co. of the 1800s extended the power of regulating commerce to transportation, and extended information to commerce. The arguments stated changes in transportation from waterways to railroads and artificial highways did not change the scope of the constitutional provisions. The U.S. Constitution was written broadly enough to incorporate technological advances of time that represented new mediums of exchange such as transportation and intelligence (Frease, 1934, pp. 71-78, 196-199).

The U.S. Constitution gave Congress the power to regulate commerce as it applied to roads, canals, and horse-drawn wagons. However, the U.S. Constitution was purposely written in a general manner by its founders as to apply to changes such as railroads, the wired and wireless telegraph, and eventually radio (Frease, 1934, pp. 61-62, 71-74, 78, 198-199). Therefore, in radio's discussion, the U.S. Attorney General, in 1903, looked at this historical precedent and concluded that any wireless transmissions that crossed interstate or international borders were subject to the power of Congress

under the Commerce Clause. Wireless transmissions were transportation of information, and transportation was commerce.

Ithiel de Sola Pool

Ithiel de Sola Pool (1983), a pioneer in social science, stated that the problem with U.S. communication policy rested in the conflict between the U.S. Constitution's First Amendment and the Commerce Clause. The First Amendment states that Congress cannot create a law which abridges the freedom of speech, or the press. Pool strongly believed that all communication came under the First Amendment protection because communication, in addition to being commerce, is speech and therefore the type of commerce to be excluded from government authority (p. 3).

However, Pool noted that new electric and electronic communication technologies did not inherit the freedom from government authority that had been established for older technologies such as print and public assembly. In fact, communications technologies developed and evolved as three separate systems (print, common carriage, and broadcasting)—technologically and legally different. Print is generally free of regulation, the common carrier (i.e., telephone) must assure non-discriminatory access, and broadcasting is licensed, has limited access due to a scarce resource, and restricts speech (Pool, 1983, pp. 3, 233; Bensman, 1985, pp. 19-20).

The new electric and electronic technologies, such as telegraph, radio, and now computers, were essentially perceived as business machines of commerce rather than as media of expression like the press. Therefore, these technologies became governed by the Communications Act of 1934 (1934), which included the Radio Act of 1927, and was based on the U.S. Constitution's Commerce Clause (Pool, 1983, pp. 224, 91-100).

In 1983 Pool saw three trends in communication technology that would change the nature of communications—making the new technology more a medium of expression rather than commerce—and making the decisions for policy problematic. As the different communication networks, first, converged through digital technology and, secondly, functioned as a single system, they would, thirdly, become decentralized and more easily available to the user. Consequently, the means of communication would be more applicable to freedom from government authority (pp. 5, 226-230). By contrast, those communications which were concentrated, monopolized, and scarce were regulated under centralized control (p. 5). He stated very clearly that society's future task would be to decide which of the three communication models (print, common carriage, or broadcasting) that were now converging digitally, would become public policy (pp. 250-251).

For guidance in policy, Pool offered ten principles that essentially placed all media under the protection of the Constitution's First Amendment, and made regulation a last recourse in which the government would place no restraint or control over the content of transmission. If regulation was necessary, Pool pictured a free market or at the very most a common carrier model, and that those privileged by regulation be subject to disclosure of their activities. Pool addressed technical standards requiring interconnection among the communication carriers, and that technical problems in the network should not serve as reason for control.

He believed any user should be able to publish with these new converged communications without license or scrutiny from the government, but he also believed that privileges such as copyright and patents should have distinct time limits.

Furthermore, publishing and copyright enforcement needed to be adapted to the nature of the technological convergence. Society would need to provide mechanisms for new forms of compensation for intellectual property (pp. 246-249). Pool looked at the regulatory history and was convinced that the convergence of these media would no longer apply as business machines (p. 250-251).

The Radio Act of 1927 was absorbed into the Communication Act of 1934 and eventually overhauled by the Telecommunications Act of 1996. The law experienced some changes in its regulatory structure in the intervening years such as longer terms for licenses, relaxing ownership rules for broadcasting stations, and eliminating requirements to survey the needs of each broadcasting community. However, by 1996, broadcasting was still subject to the public interest standard, still had restrictions on speech and incorporated the Internet under these restrictions—regulations that were still based in the Commerce Clause of the U.S. Constitution (Creech, 2003, pp. 86, 367-368; Head, 1956, 315-316).

The issue of the First Amendment had been launched after broadcasting appeared in the 1920s, and this issue was taking its first steps with a new medium. Commercial radio companies wanted freedom of speech and were strongly against censorship of programming material by the government. Even though the federal government declared they could not censor programming, they managed who would be licensed based on what they would broadcast for the public.

The subject of the First Amendment was present in the early part of the Internet's discussion, but it was those outside the federal government that were the most insistent about applying it to this new communication medium. Yet, the Telecommunications Act

of 1996 restricted speech for the Internet, and focused a great deal more effort at assuring commerce was addressed. The Internet's discussion laid the groundwork for the open market for the information infrastructure, yet there was no specific application to the First Amendment. The focus was still the economics of the industry.

Lawrence Lessig

Lawrence Lessig, a professor of constitutional law at Stanford University, explains that the basic premise of his work on the subject of cyberspace, or the Internet, is the need for society to reconcile two forces, the technologies of commerce and the rule of law. This reconciliation is based in the capacity for government to regulate behavior, that a type of regulation already exists in the form of code (software), competing sovereignty between real space and cyberspace, and applying existing law to the changes that technology brings (Lessig, 1999, pp. xii, 5-6; 1996, May; 1996, Summer).

Lessig states that the nature of the Internet is set by its architecture, the software and hardware that determines how people access the system and its resources. He refers to this as *the code*. The Internet of 1995, and earlier, was an open unregulated system because it was socially constructed by the institutions that created it. Its software architecture did not impose controls of access in its earliest stages of development. In the same fashion, the Internet is being changed by commerce to reflect the needs of commerce that institute control through zones and boundaries of access.

Lessig presents three examples of these changes the Internet is experiencing: anonymity, opportunity for warrant-less searches, and the creation of zoning. Commerce is the entity that is changing the anonymity on the Internet, and it is doing so by changing the code of the Internet's open architecture. The demands of commerce require

encryption, passwords, cookies, and digital signatures because commerce requires identity, authentication, and certification in their transactions. Changing the architectural code on the Internet changes the open nature, and anonymity begins to erode.

Changing the open architecture of the Internet also provides possibilities for the federal government to use computer codes that work through the network of computers searching for illegal copies of software, and accomplish this in a manner that is undetectable to the individual. Lessig is concerned whether society would interpret such action as a violation of the Constitution's Fourth Amendment against unlawful search. After all, the courts decided in 1928 that wiretapping an individual's personal phone was not considered trespass, and consequently, did not violate the Fourth Amendment (1996, Summer).

As these software technologies have the capability to protect privacy and institute surveillance, they also have the capability to create zones on the Internet. This change in code creates zones and boundaries of access which control property, or commerce, and decides who can access what by requiring identification or payment directly (i.e., banking transactions, copyright).

Lessig believes the changes in the code are the methods that will regulate behavior in cyberspace, and the capacity of the federal government to regulate behavior on the Internet will be through the avenue of commerce. Commerce is designing the code that changes the architecture of the Internet; they are designing a code that controls. As code is created by commerce, it can be controlled because commercial entities can be controlled by the federal government (Lessig, 1999, pp. 5-6, 53).

Radio also began with an open architecture; there was no regulation dictating its early use. However, unlike the Internet, radio had a technical problem not understood and not resolved before regulation was eventually imposed directly by the federal government. There were issues of liberty and order as licensing eliminated anonymity in the air (especially for the amateurs), and all users were allocated to a specific place in the airwaves; the access to all available frequencies were limited. Broadcasting was so new and undefined it was not clear, at first, whether existing laws of copyright and censorship applied to this medium. However, commerce was the avenue used to impose control.

Library Profession - Early Radio

The library profession's contribution to the discussion of early radio regulation cannot be determined at this time. However, documentation shows that the Library profession, and especially public libraries, utilized radio in the 1920s. Their efforts during this time strongly reflect a change in mission that was declared in 1910 by Dr. Arthur E. Bostwick of the St. Louis Public Library.

Bostwick (1910) noted that the change of aims and duties of libraries from guarding and preserving books to making them accessible to the public coincided with the recent increase in the number of popular [sic] libraries in the United States. He noted that this change was to extend library services to an entire community in much the same manner that a business distributor surveys his/her community, matches the tastes of the community, and create a demand for his goods where none previously existed (p. 3).

Bostwick indicated that the library could not wait for customers to come through the doors of the library; the library had to be an active force in moving beyond the storehouse concept (p. 2). Ideas promoted at this time were lending books for home use,

providing free access to the shelves, providing a homelike and comfortable building for patrons, instituting longer operating hours and coordinating lectures and exhibits, to name a few (p.2). Within the next decade, the library profession began utilizing radio to extend their services to their communities, and continue to discuss the potential uses of this new medium.

Articles in library journals, radio trade magazines, and publishers' magazines show evidence that libraries extended their services to their communities through broadcasting book reviews, story hours for children, and genealogy talks. In addition, library professionals discussed extending their broadcasting efforts by assisting individuals in adult education courses, providing information and talks on the specific interests of their community, and by suggesting radio be placed into the library lecture halls.

Although there is yet no evidence that places the library profession within the discussion of early radio regulation, in this author's estimation the library profession moved forward in their mission of service and access promoting the accessibility of materials to their community. They continued discussing new ways to deliver programs across the airwaves to their communities, and realized positive responses.

Library Profession - Internet

Unlike early radio, the library profession of the Internet discussion was involved with providing direct input on proposed legislation. The library profession was represented by many library types: public libraries, academic and research libraries, and national libraries, and they carried the same mission of community service and access to this discussion as those librarians of early radio broadcasting. They were present at

congressional hearings and workshops, and published papers and discussed the subject at their annual meetings—believing their profession could bring technical expertise, as well as access and service this discussion. Though the library profession was experienced at organizing and controlling the flow of information electronically, it was their emphasis of equitable and affordable access for all citizens that became their ultimate focus in the discussion.

Thesis Questions - Similarities vs. Differences, Historical Analogy, Same Conclusions?

The comparison of key participants and key issues reveals that the discussion of regulation for radio and the Internet showed similarities and differences in thought, process, and action that consisted of tensions between liberty and order, yet to the decision makers the concern for commerce outweighed concerns over liberty in different ways. The similarities of the participants and issues identified above outweigh the differences identified. This comparison reveals that society from both discussions were trying to understand how a new technology would fit and function in their existing world, given that the new technology did not fit with existing regulation. Taken together the participants and the issues prove to be an acceptable analogy in which to view the discussion of the Internet regulation.

The writings of Carey, Pool, and Lessig explain that connection of communications to transportation and commerce has been established as precedent historically and legally. Furthermore, Lessig shows that the focus is still concerned with the impact of commerce.

Both discussions were initiated within the federal government. From the beginning of the radio discussion the Navy called for regulation of use through the

Department of Commerce. Commerce was identified as the key to the regulation of wireless telegraphy, and later radio broadcasting, as the power of Congress to regulate communications rested in the U.S. Constitution's Commerce Clause [Article 1, Sec. 8]. The Internet discussion never invoked the U.S. Constitution's Commerce Clause; however, from the beginning the focus of the discussion pointed to the best interests of the computer industry and an attractive regulatory environment for the corporate sector. Table 3 shows comparisons of both discussion paths.

The most obvious difference was each discussion's end result. Radio's discussion resulted in regulated use through licensing a public resource owned by the citizens of the United States, and managed by the federal government. The Internet's discussion resulted in deregulation of the telecommunications industry to deploy the new technologies on a communications infrastructure that would be owned and managed by the private sector, and which regulated speech on the Internet.

Both discussions reflected struggles within the federal government over management of the media, though the Internet discussion contained a strong element of a call for collaboration. One of Theodore Roosevelt's reasons for creating the Roosevelt Board in 1904 was to end federal government interdepartmental struggles and place the control of federal government stations under one federal government department. Hoover also faced interdepartmental struggles when he took office as Secretary of Commerce in 1921, and consequently formed the Interdepartmental Advisory Committee on Government Broadcasting (IACGB). Hoover next worked with commercial radio to establish a place in the airwaves for companies that wanted to broadcast alongside already established radio stations in the military, commercial telegraphy, and the amateurs.

Various federal government reports from the 1980s not only called for more coordination among departments and agencies involved in projects requiring computer use, but also to include collaboration with industry and higher education/scientific research. Later, in the 1990s, the U.S. Advisory Council on the National Information Infrastructure still called for collaboration among these same groups, but now included the general public. However, none of this discussion about collaboration precluded the struggle between the National Science Foundation (NSF), and the Department of Energy's desire to manage the High Performance Computer Program, nor the struggle in Congress to decide whether the national computer network would be built, owned, and maintained in similar fashion as the U.S. Interstate Highway system, or to be turned over to private industry.

Common ground was also found in the congressional hearings, conferences workshops, and meetings held to elicit information and opinions from the participants in both discussions. The discussion from these assemblies revealed a common theme: the government addressed regulation, competition, and protection of the public for purposes of national defense, safety, as well as the public interest. Some in government were concerned about monopolistic control by commercial companies, while many outside the federal government strongly believed that imposing regulation was not in the best interest of commercial companies.

Those outside the government brought issues of not only liberty concerning equity of access and balancing this access with intellectual property protection, but also issues of too much government power, freedom of speech, and censorship. Some believed that the systems should be regulated, some did not.

Table 3.

Comparison of Discussion Paths

RADIO	INTERNET
Navy initiates discussion for control of federal government wireless stations and legislated control of commercial & amateur stations.	Executive Office (OSTP-FCCSET) initiates study of emerging issues of computer industry. Reviews regulatory policy for corporate sector advantage.
U.S. prepares for International Radio Conference	U.S. fearful of Japanese competition in computer industry
U.S. Attorney General states wireless transmissions are commerce, and Congress has power to regulate such transmissions.	FCCSET recommends collaborative effort among federal government, industry, and scientific community to invest in computing industry. Executive Office does not care for FCCSET recommendations. No action taken.
1904 Executive Order gives Navy control of federal government stations	Senator Gore works for Computer Network Study to be submitted directly to Congress.
Dept. of Commerce worked with the Navy to draft legislation up to 1920. Legislation of 1910 contained no regulatory authority. Legislation of 1912 licenses use, but regulatory authority later nullified by courts in 1920s.	Senator Gore gains control over High Performance Computing Program legislation. Overcomes struggles with Dept. of Energy (High Performance Computing Act of 1991). Executive Order of 1993 establishes National Information Task Force and Advisory Council and issues the *Agenda for Action* from the Department of Commerce (1993).
Hoover and Dept. of Commerce gain control of interdepartmental struggles over radio, and pursues work with commercial companies from 1922-1927.	NREN Workshop, National Research Council Workshop. Discuss historical models of regulation such as public utility models.
Hoover's National Radio Conferences Talks of radio broadcasting being a public utility.	Congressional hearings: Congress & Administration clearly states the National Information Infrastructure to be built, owned and managed by private sector.
Congressional Hearings: Congress resists regulating wireless telegraphy and radio broadcasting as long as possible.	National Information Infrastructure turned over to the private sector in 1995.
No evidence of Library profession's direct involvement in discussion.	Library profession participated in Congressional hearings and workshops.
Radio Act of 1927, declares the airwaves a public resource and licenses use. Licensing controls who broadcasts.	Telecommunications Act of 1996 promotes competition, reduces telecommunication regulation, and regulates Internet under broadcasting model.

The comparison shows that the same conclusion regarding regulation was reached in 1996. Tensions from both discussions represented liberty versus order. However, what resulted in both instances was a situation that favored commerce. Radio was regulated in the name of U.S. Constitution's Commerce Clause. The Internet was absorbed into the broadcasting regulations of obscenity and violence, yet the regulations forming the Internet's telecommunications infrastructure were relaxed, or deregulated, in the name of promoting commercial competition and establishing an open commercial market for deploying new technologies for this infrastructure. Commerce and control was still the focus.

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43 Cong., Rec. 60th Cong., 2d Sess., (1910)

45 Cong., Rec. 61st Cong., 2d Sess., (1910)

48 Cong., Rec. 62nd Cong., 2d Sess., (1912)

42 Cong., Rec. Index 60th Cong., 1st Sess., (1909)

43 Cong., Rec. Index 60th Cong., 2d Sess., (1909)

45 Cong., Rec. Index 61st Cong., 2d Sess., (1910)

48 Cong., Rec., Index 62nd Cong., 2d Sess. (1912)

132 Cong. Rec. H.R. 4184, 1986, June 26, pp.15689-15696

139 Cong. Rec. H1757, July 26, 1993, p. 16943

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S. 3620, 62nd Cong., 2d. Sess., (1911)

S. 2937, 102nd Cong., 2nd Sess., (1992)

S. 4, 103rd Cong., 1st Sess., (1993)

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S. 1822, 103rd Cong., 2nd Sess., (1994)

S. 314, 104th Cong., 1st Sess., (1995)

S. 892, 104th Cong., 1st Sess., (1995)

S. 982, 104th Cong., 1st Sess., (1995)

S. 1284, 104th, Cong., 1st Sess. (1995)

S. Rep., No. 659, 61st Cong., 2d Sess., (1910, May)

S. Rep. No. 698, 62nd Cong, 2d Sess., (1912, May 2-6)

S. Rep. No. 2086, 60th Cong., 2d Sess., (1909, February 9)

S. Rep. No. 103-69, 103rd Cong., 1st Sess., (1993, June 24)

S. Rep. No. 103-113, 103rd Cong., 1st Sess., (1993, July 28)

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APPENDIX A

Table A1.

Congressional Bills—Wireless Telegraphy and Radio

Congress	Session	Session Date	House	Senate	Referred to Committee	Debated	Reports	Became Law
58th	1st session	Mar 5-13, 1903; Nov-Dec 1903	None	None	N/A	N/A	N/A	N/A
	2nd session	Dec 1903-Apl 1904	None	None	N/A	N/A	N/A	N/A
	3rd session	Dec 5, 1904-Mar 4, 1905	HR 17744	None	Interstate & Foreign Commerce	No	None	None
59th	1st session	Dec 4, 1905-June 30, 1906	None	None	N/A	N/A	N/A	N/A
	2nd session	Dec 5, 1906-Mar 5, 1907	None	None	N/A	N/A	N/A	N/A
60th	1st session	Dec7, 1907-May 30, 1908	HR 18979 HR 17719 HR 21689	S 5949	Naval Affairs Judiciary Interstate & Foreign Commerce	No	None	None
	2nd session	Dec 7, 1908-Mar 4, 1909	HR 27145 HR 27318 HR 27480 HR 27672	S9279	Merchant Marine & Fisheries Interstate & Foreign Commerce Senate Committee on Commerce	No	HRep 2086	None
61st	Special session	Mar 4-6,1909	None	None	N/A	N/A	N/A	N/A
	1st session	Mar 15, 1909-Aug 5, 1909	HR 7548	S 2563	Merchant Marine & Fisheries Senate Committee on Commerce	No	None	None
	2nd session	Dec 6, 1909-June 25, 1910	HR 19560 HR 22558 HR 21757 HR 23595 HR 12384 HJres95	S 7061 S 7243 S 7021	Merchant Marine & Fisheries Naval Affairs Senate Committee on Commerce Public Law	Yes - S 7021	HRep 1373 HRep 892 SRep 659 HRep 924 SRep 421	S 7021=Public Law #262
	3rd session	Dec 5, 1910-Mar 4, 1911	None	None	N/A	N/A	N/A	N/A
62nd	1st session	April 4, 1911-Aug 22, 1911	HJ Res. 16		Naval Affairs	No	None	None
	2nd session	Dec 4, 1911-Aug 26, 1912	HR 15357 HR 23716 HR 24025 HJ Res. 300	S 3815 S 6412	Merchant Marine & Fisheries Interstate & Foreign Commerce Senate Committee on Commerce	Yes-HR 23716 Yes-HR 24025 Yes-S 3815 Yes-S 6412	HRep 582 HRep 657 SRep 680 SRep 698 HRep 741 HRep 1007 HRep 734	S 3815=Public Law #238 S 6412=Public Law #264

APPENDIX A

Table A1.

Congressional Bills—Wireless Telegraphy and Radio (cont'd)

Congress	Session	Session Date	House	Senate	Referred to Committee	Debated	Reports	Became Law
63rd	Spec session	Mar 4-17, 1913	HR 3981	None	Interstate & Foreign Commerce	No	None	None
	1st session	April 7-Dec 1, 1913						
	2nd session	Dec 1, 1913-Oct 24, 1914	None	None	N/A	N/A	N/A	N/A
	3rd session	Dec 7, 1914-Mar 4, 1915	None	None	N/A	N/A	N/A	N/A
64th	1st session	Dec 6,1915-Sept 8, 1916	HR 9821	None	Merchant Marine & Fisheries	No	None	None
	2nd session	Dec 4, 1916-Mar 4, 1917	HR 19350	S 7478	Merchant Marine & Fisheries Senate Committee on Commerce	No	None	None
65th	1st session	Oct 2-6, 1917	HR 4042 HR 2573 HR 4189	S 1733	Merchant Marine & Fisheries Senate Committee on Commerce Naval Affairs	No	None	None
	2nd session	Dec 3, 1917-Nov 21, 1918	HR 12647 HR 13159 HR 10888	S 4681 S 5036	Naval Affairs Military Affairs Merchant Marine & Fisheries Senate Committee on Commerce	Yes-HR 10888	None	None
	3rd session	Dec 2, 1918-Mar 4, 1919	HR 13159	S 5287 S5235	Interstate Commerce	Yes-S 5287	None	None
66th	1st session	May 19,1919-Nov 19,1919	HR 7288 HR 7007 HJres 291	S 2523 S 3177 S 3399	Merchant Marine & Fisheries Naval Affairs Senate Committee on Commerce	No	None	None
	2nd session	Dec 1, 1919-June 5, 1920	HR 10831 HJres 304	S 4038 S 4487 SJres 170	Merchant Marine & Fisheries Naval Affairs Senate Committee on Commerce	Yes-SJres 170	None	None
	3rd session	Dec 6, 1920-Mar 4, 1921	None	None	N/A	N/A	None	None
67th	1st session	Mar 4, -Nov 23, 1921	HR 4132 HR 5889 HR 163 HJres 7	S 31 S 1627 S 1628 S 2290 SJres 22	Merchant Marine & Fisheries Naval Affairs Interstate Commerce	Yes-HJres 7	None	None

APPENDIX A

Table A1.

Congressional Bills—Wireless Telegraphy and Radio (cont'd)

Congress	Session	Session Date	House	Senate	Referred to Committee	Debated	Reports	Became Law
67th	2nd session	Dec 5, 1921-Sept 22,1922	HR 11964 HJres 7 HJres 287	S 3694	Merchant Marine & Fisheries Interstate Commerce Agriculture	Yes-HJres 7	SRep 440	None
	3rd session	Nov 20-Dec 4, 1922	None	None	N/A	N/A	N/A	N/A
	4th session	Dec 5 , 1922-Mar 4, 1923	HR 13773 HR14169	None	Merchant Marine & Fisheries Interstate Commerce Interstate & Foreign Commerce	Yes- HR 13773	HRep 1416	None
68th	1st session	Dec 3,1923-June 7, 1924	HR 7357 HR 8334	S 2524 S 2796 S 2813 S 2930	Merchant Marine & Fisheries Committee on Commerce Interstate Commerce	Yes-S 2930	SRep 311	None
	2nd session	Dec 1, 1924-Mar 4, 1925	HJres 311 HJres 317 HJres 334	S 2930 SJres 175 SJres 177	Merchant Marine & Fisheries Committee on Commerce	N/A	HRep 33 HRep 1345 HRep 1133	None
69th	Spec session	Mar 4-Mar 18, 1925	HR 5589	S 1	Merchant Marine & Fisheries	Yes-HR 5589	HRep 404	SJres 125 = Public Law #47
	1st session	Dec 7, 1925-July 3, 1926	HR 9108	S 1754	Interstate Commerce	Yes-HR 9108	HRep 464	
	Spec session	Nov 10, 1926	HR 9971 HR 10987	S 3968 S 4057 S 4156 S 2328 SJres 125	Patents Committee of the Whole	Yes-HR 9971 Yes-SJres 125	S Rep 772	
	2nd session	Dec 6, 1926-Mar 4, 1927	HR 9971 HR 17265 HR 15090 HR 16867 HJres 294	SJres 125 SJres 132 SJres 165	Merchant Marine & Fisheries Interstate Commerce	Yes-HR 9971	HRep 1886	HR 9971=Public Law #632

Note. The list does not include legislation specifically addressing government stations for government purposes (i.e., appropriations for government stations).

APPENDIX A

Table A2.

Key Participants in Legislative Discussions—Wireless Telegraphy and Radio

Year	Government	Commercial Wireless	Amateur	Other
1904	Rear Admiral Robley D. Evans, US Navy & Department of Commerce and Labor	American Marconi		
	Rear Admiral Henry M. Manney, US Navy & Chief of the Bureau of Equipment	National Electric Signaling Co.		
	Brig. General A.W. Greeley, US Army & Chief Signal Officer	Reginald Fessenden		
	Lt. Comd Joseph L. Jayne, US Navy	Lee DeForest		
	Prof. Willis Moore, Weather Bureau, Dept. of Agriculture			
1910	Charlemagne Tower, U.S. Ambassador	C.C. Wilson, United Wireless Telegraphy Co.	W.E. Stokes, Junior Wireless Telegraph Club	
	Rear Admiral Henry N. Manney, US Navy (retired)	Samuel E. Darby, New York City Radio & Telephone Co.	George Eltz, Junior Wireless Telegraph Club & Engineers of America	
	Brig. General James Allen, US Army & Chief Signal Officer	James H. Hayden, National Electric Signaling Co.		
	Mr. John Waterbury, Department of Commerce and Labor	John Bottomley, American Marconi Wireless Co.		
	Comd. F.M. Barber, US Navy (retired)	Edwin H. Duff, Representing steamship companies		
	Eugene T. Chamberlain, Comd. Bureau of Navigation, & Department of Commerce and Labor	Thomas S. Hopkins, Hawaiian Steamship Co.		
	Lt. John Q. Walton, Revenue-Cutter Service, Treasury Department	Marshall Cloyd, Secretary, United Wireless Telegraphy Co.		

Table A2.

Key Participants in Legislative Discussions—Wireless Telegraphy and Radio (cont'd)

Year	Government	Commercial Wireless	Amateur	Other
1910	George Uhler, Supervising Inspector General Steamboat Inspection Service, Department of Commerce and Labor	Reginald Fessenden, National Electric Signaling Co. Richard Pfund, Alfred J. Ostheimer, Telefunken Wireless Telegraph Co.		
1912	Comdr. Eugene T. Chamberlain, Bureau of Navigation, Department of Commerce and Labor	Walter S. Penfield, United Fruit Co.	B. F. Rittenhouse, Charles H. Stewart Pennsylvania Wireless Association	
	Brig. General James Allen, US Army, & Chief Signal Officer.	John Bottomley, Marconi Wireless Telegraph Company of America		
	Lt. Comdr. David W. Todd, US Navy, & Bureau of Steam Engineering	Marshall Cloyd, United Wireless Telegraph Co.		
	John Q. Walton, Revenue-Cutter Service, Treasury Department	S. M. Kinter, National Electric Signaling Co.		
	Edward B. Rosa, National Bureau of Standards, Dept. of Commerce and Labor	Joseph H. Hayden William Cramp & Sons Ship and Engine Building Co.		
	L.W. Austin, Experimental Stations, National Bureau of Standards, Dept. of Commerce and Labor	Edwin H. Duff, American Steamship Association		
	Major George O. Squier, US Army	Joseph H. Hayden, National Electric Signaling Co.		
	Rear Admiral John R. Edwards, US Navy, Naval Machinery, Navy Department			

Table A2.

Key Participants in Legislative Discussions—Wireless Telegraphy and Radio (cont'd)

Year	Government	Commercial Wireless	Amateur	Other
1927	Herbert, H., Dept. of Commerce	C.B. Cooper, Radio Trade Assn. & Cooper Co.	E. H. Armstrong, Inventor/Columbia Univ.	P.B. Klugh, National Assoc. of Broadcasters
	D. Bingham., US Navy	A.H. Griswold, AT&T	C.H. Stewart, American	C.M. Jansky, Univ of Minnesota
	Capt. R. McClean, US Navy	W.E. Harkness, AT&T	Radio Relay League	
	Lt. E.M. Webster, US Coastguard		(ARRL)	
	C.W. Warburton, Dept. of Agriculture	E.J. Simon, Intercity Radio Co.	H.P. Maxim, ARRL	W.A. Strong, Chicago Federation of Labor
	S.B. Davis, Dept. of Commerce	W.G. Logue, Independent Wireless Telegraph Co.		N. Baker, American Broadcasters Assoc.
	Capt. S. W. Bryant, US Navy	D. Sarnoff, RCA		Silvo Hein, ASCAP
		A. Goldsmith, RCA		
		J. Elwood, RCA		
	W. White, Congressman, House	E.P. Edwards, GE		F.G. Helyar, Rutgers Univ
	C. Dill, Congressman, Senate			
	W.A. Wheeler, Dept. of Agriculture	E.F. McDonald, Jr.,		M. Ernst, ACLU
	D. B. Carson, Dept. of Commerce	Zenith Radio Corporation		
	J.C. Edgerton, Post Office Dept.	G. S. Davis, United Fruit Co.		A. Goldsmith, Institute of Radio Engineers
	John Sutherin, Post Office Dept.			
	Maj. General George O. Squier, War Dept.	P. Crosley, Crosley Radio Co.		L.A. Hazeltine, Stevens Institute of Technology
	L.J. Heath, Treasury Dept.			
	W.D. Terrell, Dept. of Commerce	L.R. Krumm, Westinghouse		C.M. Jansky, Univ of Minnesota
	F. P. Guthrie, US Shipping Board			R.B. Howell, Metropolitan
	L.L. Lee, Emergency Fleet Corp.			Utilities District, Omaha, NE
	J.H. Dellinger, Dept. of Commerce			L. Fitzpatrick, Radio Editor, Kansas City Star

Note. The list of key participants is not complete, but represents a majority who attended congressional hearings, meetings and conferences. The list also includes some who did not necessarily attend all four national radio conference, but their presence reflects the changing impact that broadcasting made on society (i.e., ASCAP, ACLU). Affiliations for many of the conference participants were not specified, and are consequently not listed.

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APPENDIX B

Table B1.
Congressional Bills—National Research and Education Network (NREN), National Information Infrastructure (NII)

Congress	Session	Session Date	House	Senate	Referred to Committee	Debated	Reports	Became Law
99th	1ST session	Jan 3, 1985-Dec 20,1985		S 786	Governmental Affairs		SRep 99-505	None
	2nd session	Jan 21,1986-Oct 18, 1986	HR 5515 HR 4184	S 2594 S 2672 S 2184	Commerce, Science, and Transportation Government Operations Science and Technology Science, Space and Technology Governmental Affairs Labor and Human Resources	Yes-HR 4184	HRep 99-619 SRep 99-338 SRep 99-325	HR 4184=Public Law 99-383
100th	2nd session	Jan 25,1988-Oct 21,1988		S2762 S 2918	Governmental Affairs	No	None	None
101st	1st session	Jan 3, 1989-Jan 3, 1990	HR 3131	S 1067 S 1191 S 1976	Commerce Commerce, Science, and Transportation Commerce, Science, and Transportation Science, Space, and Technology Energy and Natural Resources	No	SRep 101-159 SRep 101-377	None
	2nd session	Jan 23,1990-Jan 3, 1991	HR 4329	S 1067 S 1976	Science, Space and Technology Judiciary Merchant Marine & Fisheries	Yes-HR 4329 Yes-1067	HRep 101-481 SRep 101-387 SRep 101-377	None
102nd	1st session	Jan 3, 1991-Jan 3, 1992	HR 656	S 272 S 343	Commerce, Science, and Transportation Education and Labor Energy and Natural Resources Science, Space and Technology	Yes -S 272 Yes-HR 656	SRep 102-57 HRep 102-66 SRep 102-64	S 272=Public Law 102-194
	2nd session	Jan 3, 1992-Jan 5, 1993	HR 5759	S 2937	Commerce, Science, and Technology Commerce, Science, and Transportation Commerce Technology and Competitiveness	No	None	None

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Table B1.

Congressional Bills—National Research and Education Network (NREN), National Information Infrastructure (NII) (cont'd)

Congress	Session	Session Date	House	Senate	Referred to Committee	Debated	Reports	Became Law
103rd	1st session	Jan 5, 1993-Jan 25, 1994	HR 820 HR 1757 HR 2639 HR 3636 HR 3626	S 4 S 473 S 1782	Science, Space and Technology Labor and Human Resources Commerce	Yes- HR1757 Yes-HR 3636	HRep 103-173 SRep 103-113 HRep 103-77 HRep 103-325 HRep 103-560 SRep 103-69 SRep 103-365 SRep 103-569	None
	2nd session	Jan 25, 1994-Dec 20, 1994	HR 5199 HR 5013	S 1822 S 1883	Science, Space, and Technology	No	S Rep 103-367	None
104th	1st session	Jan 4, 1995-Jan 3, 1996	HR 2441 HR 1555	S 652 S 892 S 982 S 1284	Commerce, Science, and Transportation Judiciary Courts and Intellectual Property	Yes-S 652 Yes-HR 1555	SRep 104-357 HRep 104-204	None
	2nd session	Jan 3, 1996-Oct 21,1996	HR 3606 HR 3700 HR 3781 HR 4095 HR 4113		Commerce Telecommunications and Finance House Oversight Judiciary Commerce, Trade, and Hazardous Materials		SRep 104-23 HRep 104-458 SRep 104-230	S 652=PL 104-104

APPENDIX B

Table B2.

Key Participants in Legislative Discussion—NREN and NII

Year	Government	Higher Education	Industry/Commercial	Other
1983	Executive Office Office of Science & Technology Policy Federal Coordinating Council on Science, Engineering & Technology Dr. Robert Kahn, Dept. of Defense			
1986	Office of Science & Technology Policy Federal Coordinating Council on Science, Engineering & Technology Dr. Alvin Trivelpiece, Dept. or Energy Mr. Mary L. Good, National Science Foundation Dr. Charles Buffalano, DARPA Senator Albert Gore, Jr. Representative Douglas Walgren Dr. John Killeen, Lawrence Livermore Laboratory Dr. Eric Bloch, Director National Science Foundation (NSF)	Kenneth King, EDUCOM Dr. Larry Smarr, Univ of Illinois Dr. Ken Wilson, Cornell Univ Dr. Robert Johnson, Florida State Univ	Mr. Henry A. Zanardelli, Ford Motor Company	Dr. George Kozmetsky, Institute for Constructive Capitalism
1991	Senator Albert Gore, Jr. Senator Donald W. Riegle	Dr. John Connolly, Physics Univ of Kentucky Dr. Paul G. Huray, Research Univ of South Carolina	Dr. A. Gray Collins, Sr. VP Bell Atlantic Corp. O. Gene, Gabbard, CEO Telecom USA	James H. Billington, Librarian Library of Congress Henriette Avram, Asst. Librarian Library of Congress

APPENDIX B

Table B2.

Key Participants in Legislative Discussion—NREN and NII (cont'd)

Year	Government	Higher Education	Industry/Commercial	Other
1991	Dr. Robert E. Dickinson National Center for Atmospheric Research	Dr. Kenneth M. King, EDUCOM	Sheryl L. Hander, President Thinking Machines, Inc.	Dr. Daniel S. Masys, Dir. Lister Hill, National Center for Biomedical Communications National Library of Medicine
	Dr. Robert E. Kahn Corporation for National Research Initiative	Dr. Leonard Kleinrock, Computer Science, Univ. of California	Richard T. Liebhaber, VP MCI Communication Corp.	Richard T. Wood, Sr. VP Business Development University Microfilm
	Dr. Paul Kutler, NASA	Dr. Alan McAdams, Grad School of Management Cornell University	Robert W. Lucky, Dir. Research AT&T Bell Laboratories	Paul M. Gherman, Dir. of Libraries Virginia Polytechnic Institute
	Dr. William Wulf, NSF	Dr. Ray Reddy, Robotics Inst. Carnegie-Mellon University	John A. Rollwagen, CEO Cray Research, Inc.	Timothy B. King, VP Marketing John Wiley & Sons, Inc.
	Dr. John N. Fisher, Act Assoc. Dir. , USGS	Dr. Joe Wyatt, Chancellor Vanderbilt University	Dr. David Nagel Apple Computer, Inc.	Ralph E. Crafts, President Ada Software Alliance
	Senator Wendell H. Ford (KY)	Dr. Michael E. Schlesinger, Atmospheric Sciences University of Illinois	Dr. J. William Poduska, CEO Stellar Computer, Inc.	IEEE U.S. Activities Board
	Senator Jeff Bingaman, (NM)	Dr. Martin Massengale, Chancellor, Univ of Nebraska	Dr. James H. Clark, Chairman Silicon Graphics	Association of Research Libraries (ARL)
	Dr. Siegfried S. Hecker, Dir. Los Alamos National Laboratory	Dr. James H. Woodward, Chancellor, University of North Carolina	Ted Nelson, Autodesk, Inc.	American Library Association (ALA)
	Senator James A. McClure, (ID)	Dr. Ken Kennedy, Computer & Information Inst. Rice University	Dr. Irving Wladawaky, DSD VP IBM Corp.	
	Senator J. Bennett Johnston, (LA)	Dr. Herbert Freeman, Dir. CAIP Rutgers University	Robert J. Paluck, Chairman Convex Computer Corp.	

APPENDIX B

Table B2.

Key Participants in Legislative Discussion—NREN and NII (cont'd)

Year	Government	Higher Education	Industry/Commercial	Other
1991	Dr. David B. Nelson, Dir. Energy Research, Dept. of Energy Dr. D. Allan Bromley, Dir., OSTP Dr. Fred Weingarten, Sr. Assoc. Office of Technology Assessment Dr. Glenn Ricart, Director SURANET, Washington, D.C. Dr. Eric Bloch, Director NSF	Dr. Paul Young, Prof. Computer Science University of Washington Dr. Gregory J. McRae, Professor Engineering & Public Policy Carnegie Mellon University Dr. George L. Johnston, Research Scientist, MIT Dr. Lawrence A. Lee, Director North Carolina Supercomputing Center, Research Triangle Park.	Dr. Alan G. Chynoweth, VP Applied Research Bell Communications Research Dr. Allan H. Weis, VP Engineering & Scientific Computing, IBM Corp. Dr. Albert M. Erisman, Boeing Computer Services Justin, R. Rattner, Fellow Intel Scientific Computers Jim Young, VP for Regulation and Industrial Relations Bell Atlantic Dr. Steward D. Personick, VP Information Networking Research Bell Communications Research Dr. James E. Rottsolk, Pres., CEO Tera Computer Co.	
1996	Senator Albert Gore, Jr. (TN) President William J. Clinton Senator Jim Exon (NE) Senator Jim Pressler, (SD) Ronald Brown, Secretary of Commerce	Lee Alley, Arizona State Univ J. Gary Augustson, Pennsylvania State University George Badger, Univ of Illinois-Urbana-Champaign	Guy Almes, Advanced Network & Services, Inc. Eric M. Aupperle, Jim Williams, Merit Network Steve Cisler, Michael Liebhold, Apple Computer, Inc.	Pru Adler, Assoc. Research Libraries Richard Akeroyd, Connecticut State Library Carol Henderson, Betty Turock American Library Assoc.

APPENDIX B

Table B2.

Key Participants in Legislative Discussion—NREN and NII (cont'd)

Year	Government	Higher Education	Industry/Commercial	Other
1996	Robert Huelskamp, Sandia National Laboratories	Elizabeth Barnhart, Michael Roberts, Kenneth King, EDUCOM	Robert Doyle, Sprint Gov. Systems Division	James Billington, William Ellis, Sarah Thomas, Library of Congress
	Nancy Tosta, U.S. Geological Survey	Charles Bartel Carnegie Mellon University	Jim Elias, US West Communications	Clifford Lynch, University of California System
	William Wing, Oak Ridge National Laboratory	Erv Blythe, Virginia Polytechnic Institute & State University	Robert Ellis, Sun Microsystems Laboratories, Inc.	Janet Meizel Davis High School
	Eugene Wong, David Lytel, White House Office of Science and Technology Policy	Kenneth Klingenstein, University of Colorado - Boulder	Erik Grimmelmann, Fred Howlett, AT&T	Paul Evans Peters, Joan Lippincott , Coalition for Networked Information (CNI)
	Alfred Lee, National Telecommunications and Information Administration	Barbara Morgan Cecilia Preston, Univ of California at Berkeley	Robert Shahan IBM Corp.	Daniel Weitzner, Mitchell Kapor, Electronic Frontier Foundation
	Robert Aiken, Dept. of Energy	John Vaughn, Assoc. of American Universities	Ann O'Beay, MCI Telecommunication Corp.	John Clement, Consortium for School Networking
	Jane Caviness, National Science Foundation	Dr. Lawrence Lessig, Professor of Law, Harvard University	Frank Odasz, Big Sky Telegraph	Peter Young, National Commission on Libraries and Information Sciences (NCLIS)
	National Research Council	John Mayo, Univ of Tennessee	Steward Personick, Bell Communications Research, Inc.	Charles M. Firestone, Aspen Institute
	Robert Gellman, Congress House Government Operations Committee	Lee McKnight, Massachusetts Institute of Technology	Roxanne Streeter, Sterling Software	Jane Bortnick-Griffiths, Library of Congress
	Duane A. Adams, ARPA	Eli M. Noam, Columbia University	Robert Heterick, WESTLAW Research and Development	Robert W. Crandall, Brookings Institution
	Michael Einhorn U.S. Dept. of Justice	Roger G. Noll Stanford University	Robert E. Kahn, Corp. for National Research Initiatives	Scott Roberts Annenberg/CPB

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Table B2.

Key Participants in Legislative Discussion—NREN and NII (cont'd)

Year	Government	Higher Education	Industry/Commercial	Other
1996	Mary Jo Deering, Stephen J. Down, Kevin Patrick, U.S. Dept. of Health and Human Services/Public Health Service	John M. Richardson, Univ of Maryland	Tim Finton, Honeywell, Inc.	Michael Koenig, Dean Grad School of Library & Information Science Rosary College
	Kenneth Flamm, U.S. Dept. of Defense	Glen Robinson, Univ. of Virginia Law School	Raul G. Catangui, Corning Inc.	Donald A. Lindberg, The National Library of Medicine
	Robert Pepper, Federal Communications Commission	Edward H. Shortliffe Stanford Univ. School of Medicine	Colin Crook, Citcorp, N.A.	Mr. Robert McGlotten, Legislative Dir. AFL-CIO
	Lucy Richards, Congress House Science, Space and Technology Committee	Russell Hobby Univ. of California-Davis	Joel Engel, Ameritech	Henry Geller, Communications Fellow, The Markle Foundation
	Michael Telson, Congress House Budget Committee	Edward Sharp The University of Utah	David Nicoll, National Cable Television Association	Estelle. M. Black, Asst. Dir. Rockford Public Library Rockford, IL
	Linda Roberts, U.S. Dept. of Education		Frank Bennack, President/CEO Hearst Corporation, on behalf of Newspaper Association of America	Kenneth Gordon Massachusetts Dept. of Public Utilities
	Anne K. Bingaman, Attorney General for Anti-trust, U.S. Dept. of Justice		James G. Cullen, President Bell Atlantic Corporation	Ronald Binz National Assoc. of State Utility Consumer Advocates
	Larry Irving, Assist. Secretary for Communications and Information, U.S. Dept. of Commerce		Jack Fishman, President Lakeway Publishing on behalf of National Newspaper Assoc.	Nan Norton, Chair National Assoc. of Regulatory Commissioners
	Reed E. Hundt, Chairman Alfred C. Sikes, Chairman Federal Communications Committee (FCC)		Stan Martin, Exec. Dir. National Burglar and Fire Alarm Association	Fred Weingarten, Sr. Policy Fellow American Library Association Washington Office

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Table B2.

Key Participants in Legislative Discussion—NREN and NII (cont'd)

Year	Government	Higher Education	Industry/Commercial	Other
1996			Paul W. Schroeder, Dir. Gov. Affairs American Council of the Blind Gerald Hassell. Sr. Exec. VP Bank of New York Edward O. Fritts, Pres./CEO National Association of Broadcasters Preston R. Paddon, Pres., Net. Distr., Fox Broadcasting Dion Blanchard, Manager of Telecommunications, First American Bank Corp. J. Quigley, Pres./CEO Pacific Bell	

Note. The list of key participants is not complete, but represent a majority who attended meetings, workshops, conferences, and congressional hearings. Sources for the information found in this table derive from not only the Congressional Records listed below, but also those listed in the complete reference list.

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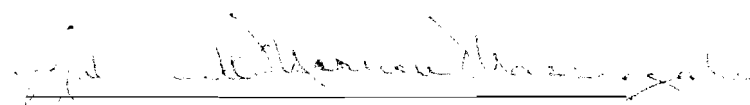

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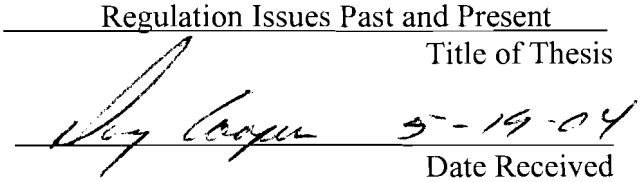

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