

THE DEVELOPMENT OF RADIO

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Summary

Early inventions like the wireless and successful experiments of radiotelephony over time merged with business interests to create the powerful radio broadcast industry of modern day. This chapter addresses the key developments and uses of radio. Beginning with Marconi's successful transmission of the letter "S" from England to Newfoundland in 1898, the timeline continues with Fessenden's 1906 successful Christmas Eve radiotelephony transmission from Brant Rock in Massachusetts--the first publicly announced broadcast. Other key historical developments of radio's timeline include the pioneer broadcast station KDKA in Pittsburgh; the formation of the networks and the creation of the radio audience; radio's golden age of programming; the development of FM radio; and the impact of television on the radio industry. Technological advancements are important because they ensure the continued viability of radio. However, these developments must be considered in the light of the role of radio in society. Technological advancements are vital but this must not overshadow the fact that such developments occur in order to serve society. Radio serves society in a variety of capacities: education, entertainment, military affairs, and public affairs such as news and politics. Land-grant universities once envisioned radio as a powerful tool for educating mass numbers of the population. Educational radio stations numbered more than 200 during the early 1920s but dropped to 35 by 1941 due to the lack of funding.

The first radiotelephony broadcast served an entertainment purpose and consisted of Fessenden playing the violin as well as playing phonograph recordings. Musical artists continue to entertain the public through radio. During World War I, the United States

government took control of radio airwaves by ordering amateur operators off the air and authorizing the Navy to exert complete control of what was perceived as a marine service. In 1920 private ownership was restored. During World War II, the American government limited the licensing of new radio stations. Political radio broadcasting began early in the United States during the late 1930s, with political candidates airing radio advertisements. Political radio became a staple of American society as early as 1944 when, due to poor health, FDR relied predominantly on radio to run his fourth successful presidential bid. On election night in 1944, the radio networks dropped regular programming in order to carry the election results. Political radio continues today with recent and current presidents' weekly radio broadcasts and an extensive variety of talk radio shows.

Broadcast journalism developed during World War II. Edward R. Murrow, considered to be the founder of broadcast journalism, became famous for his eloquent and vivid broadcasts describing the bombing of London by Hitler's warplanes. Listeners became so engrossed in Murrow's news coverage that they actually felt as if they were there and experiencing the terror in London. Countries use radio to project their policies and values onto other nations. Future technological advancements include the evolution into digital radio, the increasing value of micro-powered radio stations, and the future of radio and the Internet.

1. Introduction

Radio technology is a useful channel through which people communicate. Messages sent through invisible airwaves inform, persuade and entertain. Radio connects individuals across geographical, cultural, and even political divides. The British Broadcasting Corporation (BBC) was the first to use radio as a forum for addressing public issues. The BBC aired a debate on communism on February 22, 1923 and the public reaction was favorable. To understand the communicative power of radio one should examine the technological developments in order to realize radio's tangible capabilities, as well as the societal uses of such technologies in order to realize radio's intangible capabilities.

The technological and social aspects of radio are both addressed in this chapter. First, a timeline presenting technological accomplishments is outlined. Second, how society incorporated radio technology in useful ways is presented. As Judge Stephen B. Davis stated in 1927, "There probably has never been a scientific development that was as quickly translated into popular use as was radio broadcasting." Four ways in which radio serves society are discussed. Radio is educational, entertaining, and useful for increased awareness in both military and public affairs. The historical technological developments of radio's creation are addressed next.

2. Historical Developments of Radio's Timeline

Inventors from all over the world contributed to the creation and development of radio. Early theories about radio were proven by later experiments and became a reality when devices were produced. As the public became more interested, radio became an organized profit-making industry. Technology continued to develop and radio was

improved, and then almost forgotten when the more exciting television appeared on the scene. Radio adapted, survived and spread throughout the world.

2.1. Early Radio Transmissions

As early as 1895 and continuing to the present, inventors from around the world contributed to the creation and development of radio. In some cases, inventors in different countries invented the same devices because there was no quick way to communicate the development and successes of these devices. Eventually, this led to countless rivalries, claims, counterclaims and patent suits.

Radio technology started in 1864 when James Clerk Maxwell, a Scottish mathematician and physicist, theorized that when electricity passes through a wire, it gives off invisible waves under certain conditions. A young German named Heinrich Hertz proved this theory in 1887 and 1888. Professor Popov, a Russian scientist, experimented with wireless transmission around 1895. The Italian inventor, Guglielmo Marconi, successfully transmitted wireless signals in his radiotelegraphy experiments, which began in 1895 and continued through 1899. Marconi's wireless transmissions were first sent across distances of two miles on his father's Italian estate, then increased to eight miles or more. He transmitted across the English Channel and then the Atlantic Ocean. This last experiment involved transmitting the letter 'S' in Morse code from Newfoundland to England.

Marconi's experiments used a spark gap transmitter that was effective for Morse code transmission but was incapable of voice or music transmission. The "arc" called the continuous wave system (CW) improved the transmission of messages over longer distances and was more efficient than the spark gap transmitter. Reginald A. Fessenden, a Canadian professor of electrical engineering at the University of Pittsburgh, believed there could be an even better system than the CW. Fessenden asked GE to design a transmitter using a high speed generator of alternating currents in order to create the type of carrier wave needed for voice transmission. A GE engineer, E. F. W. Alexanderson, did just that. In 1906, he developed the Alexanderson alternator, which was effective for longer distances and transatlantic communication. The first radiotelephony broadcast occurred in 1906 at Brant Rock, Massachusetts, when Fessenden sang and played the violin on Christmas Eve and then again on New Year's Eve. The audience consisted of a few notified newspaper representatives and shipboard operators. Some operators believed they were hearing angels' voices coming from their equipment. Fessenden aired the broadcast to gain publicity for his business interests, not as a program service for the public. In October 1917, the Russian cruiser Aurora aired the world's first public service broadcast.

The only way to make the alternator more powerful was to make it bigger. The large, bulky and heavy alternator was burdensome. Such negative qualities encouraged the creation of smaller, lighter inventions. By 1915, the vacuum-tube transmitter was developed using inventions from Lee de Forest and John Ambrose Fleming. The vacuum-tube transmitter was smaller in size and weight than the alternator, thus less burdensome. The U.S. navy used the vacuum-tube transmitter extensively in World War I. Radio was based on tubes until the late 1950s when the transistor was developed.

2.2. Radio Becomes Big Business

This chapter now addresses how radio was transformed from a technological innovation to an integral part of society. Radio became a large industry once radio networks were formed, audiences were targeted, and advertising was created.

2.2.1. Formation of Radio Networks

Amateur radio operators started radio stations as early as 1909 in the United States. "Doc" Herrold broadcast one night a week in San Jose, California until World War I, when amateur stations were closed. However, the University of Wisconsin at Madison was permitted to operate as a telegraph station during World War I, sending weather reports to ships on the Great Lakes. KDKA in Pittsburgh, Pennsylvania is considered the first and oldest radio station in the U.S. Dr. Frank Conrad was the station's first broadcaster. Conrad began his career first as an independent amateur radio operator. He was in the habit of going on the air every Sunday and Wednesday night, talking about news on the air and playing records by placing the microphone next to the phonograph. The Westinghouse Company noticed his regular broadcast schedule, and decided to generate public interest in the radio market. It convinced Conrad to set up his transmitter on top of their building. Together, they applied for special call letters and a frequency through the Department of Commerce (the Federal Communications Commission did not exist yet). KDKA went on the air on November 2, 1920 to broadcast the election results from the presidential election and has operated ever since. The number of radio stations grew rapidly from 30 broadcasting stations authorized by the U.S. Department of Commerce in January 1922, to 218 by May 1922, 556 by March 1923, increasing to 765 by 1940. The early broadcasters' involvement in radio was of a secondary interest. The owners were varied and included radio manufacturers, educational institutions, newspapers, department stores, automobile dealers, music stores, churches, police and fire departments in cities, hardware stores, and even railroad and telephone companies.

Early in radio history, there was the idea of connecting radio stations for simultaneous broadcasting called "chain broadcasting" or "networking." The first such successful attempts were typically one-time events, such as a remote coverage of a sporting event sent over telephone lines. AT&T engineers set up the first U.S. network broadcast on January 4, 1923, using telephone circuits to connect the transmitters of WNAC in Boston and WEAF in New York for a five-minute saxophone solo. By June of that year, four stations were connected--WEAF in New York City; WGY in Schenectady, New York; KDKA in Pittsburgh; and KYW in Chicago--for a one-time program celebrating the electric light. In July, WEAF sent several programs each day to WMAF in South Dartmouth, Massachusetts. The WEAF group, the AT&T radio network, was composed of over 20 stations by 1925. Radio networking was evolving and growing.

Radio stations switched owners as businesses fought for control of the radio market. The WEAF group became the Broadcasting Company of America and was sold to NBC, the National Broadcasting Company (a consortium of RCA, GE and Westinghouse) for \$1 million in 1926. NBC broadcast programs that could be heard all the way to Kansas City. By 1927, NBC had so many affiliated stations that a second network was

established with WJZ in New York. This was used as the base station. To distinguish between the two networks, NBC labeled one network the NBC-Red Network (WEAF) and the other the NBC-Blue Network (WJZ). By 1928, NBC was broadcasting coast-to-coast.

Recognizing NBC's success, Arthur Judson, a business manager of the Philadelphia Orchestra, formed a rival network to NBC in 1927. However, Judson was unsuccessful and merged with Columbia Records. This merger did not succeed and William S. Paley stepped in and purchased the two companies in 1928. Paley had a prior interest in radio and had advertised his family's cigar business on Judson's network. Paley officially changed the network's name to the Columbia Broadcasting System (CBS).

In 1935, The Mutual Network (MN) was formed. Unlike NBC and CBS, MN had no national production center. MN was based on mutual support, and participating stations agreed to share programs. Although MN comprised 40 percent of the radio market after World War II, it was one of the weaker networks because MN did not have stations in every market. Most of the major-market radio stations were already affiliated with NBC and CBS. Most of the MN member stations were typically smaller and less important.

After NBC lost legal challenges to the FCC chain regulation rules in 1943, NBC sold one of its two networks. The "NBC-Red Network" became known as NBC. The NBC-Blue Network was sold and combined with WMCA, a New York based station. In 1945, after FCC approval, the former NBC-Blue Network officially became the American Broadcasting Company (ABC). The radio networks were formed. (See *International Communications and Media Networks*.)

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Biographical Sketch

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