

4. Radio

This section describes the explosion of the radio broadcasting and radio manufacturing industries from KDKA in 1920 through the emergence of dominance of radio by the three national broadcast networks. The three main sections are: the simultaneous creation of the broadcasting and consumer electronics businesses by H. P. Davis and the growth of those industries in the 1920s, the development of federal government policy on public ownership of the airwaves by Herbert Hoover, and the emergence of advertising as the economic foundation of broadcasting with a focus on William Paley. Key topics are: the nationwide excitement about radio; pioneering role of Westinghouse; RCA as sales arm for the “radio trust” of GE and Westinghouse; the competitive market for cheap radio sets; the simultaneous evolution of broadcasting, phonograph, & movies; AT&T’s effort to monopolize broadcasting and its powerful role in the movie business; radio chaos and competition; federal policy concerns; the FRC; the table of allocations; the inexorable rise of advertising; the dominance of content by the three networks.

Monopoly Enthroned

5. The 1934 Communications Act

This is a short section describing the debate (or lack thereof) in enacting the 1934 Act that governed telecommunications, radio, and TV regulation for 40 years. It concludes the thread on the emergence of the telecommunications and broadcasting industries that initiated the electronic revolution, sets the stage for the next two chapters, and sketches the powerful role of the FCC.

6. The AT&T Monopoly

This section traces the continuing growth and dominance of AT&T into the 1970s. Key points are: the stability of continuing centralized management; the consolidation of state and federal regulatory roles; economic power; World War II and integration with the Defense Department; the development of microwave and other new technologies; cross-subsidization of local and long distance services; political and economic power; and continuing antitrust concerns.

7. The Monopoly of the Three TV Networks

This section sketches the growth of network radio in the 1930s and 1940s, the continuation of the business and regulatory model of three networks into TV, and the solidification of government control over content. Key points are: the power of the three radio networks over local stations; the power of network radio advertising; the table of allocations extended into TV; the production, networking, and startup costs of TV broadcasting; efforts at competition including Dumont, FM, and UHF; color; content regulation instead of antitrust; the public acceptance of its inevitability.

Monopoly Undone

8. The Gathering Storm

This is a short section on the accumulation of technologies following WW II and the emergence of real demand for alternative services in telecommunications and TV. Key points are microwave; cross-subsidization; Intelsat; computer centers and data communications; cable TV; satellites;

9. The Transformation of TV (OTP, Astra) ¹

This section goes into how microwave, cable, and satellites undermined the economics of the three-network dominance of television. It deals at length with the OTP role. Another organizational scheme would have a separate chapter on OTP after chapters 9 & 10.

¹ [Of particular interest to the development of the early policy narrative at OTP would be Mr. Whitehead's remarks at George Mason University School of Law, March 23, 2004, as listed in Bibliography I. Mr. Whitehead intended to write *Chapters 9* and *10* in the first voice.]

Epilogue

Competition works. The regulatory structures of the Twentieth Century should be scrapped and the Twenty-First Century should be a century free of government direction of pipes and content.

It was the *Twentieth* Century. There was electricity in the air, the excitement of a new era. Science was ascendant. New inventions were arriving daily. Cars, electric lights, washing machines, and telephones were coming to the American home. And electricity was literally in the air, as Gug(?) Marconi sent the first wireless communications through the ether. It was to be the century of electronic communications – communications so different in kind and scope that they would deeply change our perceptions of time and space, personal and group identity, and political and religious authority. Now at the outset of the Twenty-first Century, we see and interact with the world differently than all generations before. The Twentieth Century changed human communications fundamentally and forever.

Movies, phonograph, ...

This book is about the telephone, television, and internet communications we use every day – those that we take for granted and the new developments that alternately amaze and perplex us – how they were created through invention, industry, regulation, and our individual and public accommodation to them. It is a century-long story of the creation of new industries rife with competition, the consolidation of those industries into incredibly powerful and stable monopoly structures, and then the transformation of those industries through the rebirth of competition and the proliferation of myriad new kinds of communication.

Of course, the telegraph and telephone predated 1900, as did early wireless experiments, but the turn of the century marked the true birth of the electronic communications industry, comprising the telephone, broadcasting, and the internet, that was to become one of the signal legacies of the Twentieth Century. The industry was born and grew from fundamental developments in technical invention, financial formation, and business management.

Invention: The telegraph and telephone were *electric* technologies, employing batteries, generators, and mechanical switches, and early wireless transmissions were generated by huge electric sparks. But the invention of the vacuum tube in the early Twentieth Century (followed in mid-century by its successor, the transistor), sparked inventions using much more capable and versatile *electronic* technology that made possible new telephone and wireless communications that were impossible with brute-force electricity. The invention of vacuum tube amplifiers made long distance telephone calls practicable, and the invention of sophisticated electronic circuitry allowed wireless communications to operate over more frequencies, longer distances, and to carry voice and music instead of just morse code. This electronic communications technology was not evolutionary phenomenon; it was an explosion in sophistication and capability.

Finance: The frequent announcements of new communications technologies fed public fascination and demand for communications services. And the construction of the facilities to satisfy that demand required massive amounts of capital. The ability to attract large amounts of capital on a continuing basis to feed the growth of the communications industry required changes in the financial world to provide the capital

and practical business structures for the efficient deployment of that capital. Many inventors' dreams went unrealized while their inventions were incorporated into the businesses of the men who learned how to combine invention, capital, and growth. The communications business was from the outset and remains today a highly capital intensive business. While one could argue that Wall Street took over the industry or that the industry learned to tap the power of the New York capital markets, the attraction was mutual, and throughout the century, the industry has been shaped as much by finance as technology.

Management: As the many business failures of the early years attest, invention and capital alone did not assure success. The third vital component that breathed life into the technology and capital was the development of new business models and the art of shaping technology and capital together to create and then continue to meet new market demand. There were models to draw on for managing large, capital intensive network industries – railroads, telegraph, express postal service, and electric utilities - but none matched the complexity, scale, speed, and dynamism of this new industry.¹ The older industries grew from man's natural desire to transport goods and letters faster and to devise better forms of energy, but there was no natural market demand for the electronic communications industries. For the most part people wondered at the mystery of the new inventions, but even as we take them for granted today, our counterparts in the early 1900s had no well-formed conceptions of how they were to use them. The evolution of the electronic communications industry can be traced in technology and finance, but the real story is the people who had the business vision and management acumen to orchestrate technology, finance, and markets and thereby shape the telephone, radio, television, and internet services we have today.^{2 3}

Two signal events set the stage for the formation of modern electronic communications, each in the latter half of 1899. each in New York. One presaged the transformation of the highly competitive telephone industry into a massive national monopoly, the other signaled the creation of a totally new wireless industry.

[Bell Company becomes a New York corporation, shifts to New York financial markets for future capital to counter competition, throws in lot with Morgan banking syndicate, consolidates Erie, brings back Vail.]

[Marconi provides wireless coverage of yacht races to NY newspaper(s?), builds public awareness and fascination with wireless communications, sets stage to create American Marconi to tap US markets and capital.]

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² This is pretty hyperbolic. Can we make sense of this paragraph?

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[Concluding paragraph.]

Chapter 1 tells the story of the *creation* of the electronic communications industries from 1900 to the early 1930s - the formation of the AT&T monopoly to eliminate telephone competition and the birth of radio broadcasting in a competitive flurry that quickly settled into a monopoly of three national broadcast networks.

Chapter 2 traces the *consolidation* of the powerful telephone and broadcast network monopolies from the 1930s through the 1970s – AT&T's growth from a telephone company into a modern all-purpose national and international telecommunications company, the three radio networks' extension of their monopoly into a monopoly of three national TV networks, and the passage of the 1934 Communications Act that created the FCC to oversee these powerful new monopolies.⁴

Chapter 3 tells the story of the reintroduction of *competition* into the telecommunications and television industries from the 1970s through the end of the Century – the proliferation of new communications technologies after WW II that made the telecommunications and television monopolies vulnerable to competition, and the shift from a scarcity-based regime of legalistic regulation of long-established monopolies to a fundamentally new regime based on the growth of new services and competitive market forces.

** Need to address how & why the book is focused on the US.

⁴ Footnote here to explain the use of the word “monopoly”. Qualification of economic meaning for telephone and simpler construction than “oligopoly” in broadcasting.

Introduction

It was the Twentieth Century. There was electricity in the air, the excitement of a new era. Science was ascendant. New inventions were arriving daily. Cars, electric lights, washing machines, and telephones were coming to the American home.¹ And electricity was literally in the air,² as Guglielmo Marconi sent the first wireless communications through the ether.³ It was to be the century of electronic communications – communications so different in kind and scope that they would deeply change our perceptions of time and space, personal and group identity, and political and religious authority.⁴ Now at the outset of the Twenty-first Century, we see and interact

¹ [Robert S. Lynd and Helen Merrell Lynd, *Middletown: A Study in Contemporary American Culture*, (London: Constable & Co. LTD, 1929) at 95 (cars); 98, 172 (electricity); 173, 275 (telephones); 174, 498 (washing machines); Robert S. Lynd and Helen Merrell Lynd, *Middletown in Transition: A Study in Cultural Conflicts* (New York: Harcourt, Brace and Company, 1937) at 26ff (cars become part of the American dream).]

² [John Durham Peters, *A History of the Idea of Communication* (Chicago: The University of Chicago Press, 1999) at 212 citing Bruce Bliven, “The Legion Family and the Radio: What We Hear When We Tune In,” *Century Magazine* (October 1924): 822-828 at 814 (“Out of the air comes the sizzle of static. The carrying wave of station after station whistles shrilly, cheerful mischievous devils signaling to presumptuous mortal man from somewhere in the empyrean.”).]

³ [Hugh G. Aitken, *Syntony and Spark, The Origins of Radio* (Princeton: Princeton University Press, 1985) at 179ff; Orrin E. Dunlap, *Marconi: The Man and His Wireless* (New York: The MacMillan Company, 1937); W.J. Baker, *A History of the Marconi Company* (New York: St. Martin’s Press, 1971); Gavin Weightman, *Signor Marconi’s Magic Box: The Most Remarkable Invention of the 19th Century & the Amateur Inventor Whose Genius Sparked a Revolution* (Cambridge: Da Capo Press, 2003); Susan J. Douglas, *Inventing American Broadcasting, 1899-1922* (Baltimore: Johns Hopkins University Press, 1987) at 3ff.]

⁴ [Claude S. Fischer, *America Calling: A Social History of the Telephone to 1940*, (Berkeley: University of California Press, 1992); Peters, *Speaking Into the Air*, 195ff; Lynd and Lynd, *Middletown* at 95, 137, 257 (cars made distances seem shorter and changed socialization habits); 140 n. (telephone’s impact on gender roles); 273 (telephone altered socialization habits); 269ff (radio broadened communities and homogenized culture); Douglas, *Inventing American Broadcasting*, 305-06 (citing Waldemar Kaempffert, “Social Destiny of Radio,” *Forum* 71 (June 1924): 771-72. “The aspect of radio most universally praised in the press was its ability to promote cultural unity in the United States. The author of an article titled ‘The Social Destiny of Radio’ maintained that prior to broadcasting, a sense of nationhood, a conception that Americans were all part of one country, was only an abstract idea, often without much force. The millions of towns and houses across America were unrelated and disconnected. But now that atomized state of affairs was changing: ‘If these little towns and villages so remote from one another, so nationally related and yet physically so unrelated, could be made to acquire a sense of intimacy, if they could be brought into direct contact with one another! This is exactly what radio is bringing about. . . . How fine is the texture of the web that

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Of course, the telegraph and telephone predated 1900,⁵ as did early wireless experiments, but the turn of the century marked the true birth of the electronic communications industry, comprising the telephone, broadcasting, and the internet, that was to become one of the signal legacies of the Twentieth Century. The industry was born and grew from fundamental developments in technical invention, financial formation, and business management.

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radio is even now spinning! It is achieving the task of making us feel together, think together, live together.”). Douglas, *Inventing American Broadcasting*, 306 (citing Stanley Frost, “Radio Dreams That Can Come True,” *Collier’s* 69 (June 10, 1922): 18. Radio was “spreading mutual understanding to all sections of the country, unifying our thoughts, ideals, and purposes, making us a strong and well-knit people.”.)]

⁵ [Anton A. Hurdeman, *The Worldwide History of Telecommunications* (Hoboken, N.J.: Wiley-Interscience, A John Wiley & Sons, Inc., Publication, 2003) at 141ff (telegraph), 156ff (telephone).]

⁶ [J. Warren Stehman, *The Financial History of the American Telephone and Telegraph Company* (New York: Augustus M. Kelley Publishers, 1967) at 3; Horace Coon, *American Tel & Tel: The Story of a Great Monopoly* (Plainview, New York: Books for Libraries Press, 1976).]

⁷ [Aitken, *Syntony & Spark*, 27ff.]

⁸ [Douglas, *Inventing American Broadcasting*, 278ff; Aitken, *Syntony & Spark*; Baker,

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Management: As the many business failures of the early years attest, invention and capital alone did not assure success. The third vital component that breathed life into the technology and capital was the development of new business models and the art of shaping technology and capital together to create and then continue to meet new market demand.¹¹ There were models to draw on for managing large, capital intensive network industries – railroads, telegraph, express postal service, and electric utilities - but none

History of the Marconi Co.]

⁹ [For instance, Lee De Forest received only a fraction of the value of his patent when he sold AT&T the rights to use his audion as a telephone repeater. Douglas, *Inventing American Broadcasting*, 243-44.]

¹⁰ [For discussions of the capital needed to establish: (1) Marconi's wireless companies see Douglas, *Inventing American Broadcasting*, 16ff; Baker, *History of the Marconi Co.*, 28ff; Aitken, *Syntony*, 222ff; and Weightman, *Signor Marconi's Magic Box*, 22-23; (2) Bell's telephone and the formation of AT&T, see Stehman, *The Financial History of the American Telephone and Telegraph Company*; N.R. Danielian, *A.T.&T.: The Story of Industrial Conquest* (New York: The Vanguard Press, 1939); Coon, *American Tel & Tel*; (3) CBS see Gleason L. Archer, *Big Business and Radio*, (New York: The American Historical Company, Inc., 1939); Laurence Bergreen, *Look Now, Pay Later: The Rise of Network Broadcasting*, (Garden City, NY: Doubleday & Company, Inc., 1980); Erik Barnouw, *A Tower in Babel: A History of Broadcasting in the United States to 1933* (New York: Oxford University Press, 1966).]

¹¹ [For discussions of H.P. Davis's development of the broadcast industry, see Douglas, *Inventing American Broadcasting*; Baker, *History of the Marconi Co.*; Aitken, *Syntony*; and Weightman, *Signor Marconi's Magic Box*; for Vail's decisions that helped enable AT&T's monopoly, see Stehman, *The Financial History of the American Telephone and Telegraph Company*, Danielian; *AT&T*; and Coon, *American Tel & Tel*; for Marconi's development of a radio industry, see Douglas, *Inventing American Broadcasting*; Baker, *History of the Marconi Co.*; Aitken, *Syntony*; and Weightman, *Signor Marconi's Magic Box*.]

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¹² [CTW:] Is this true? Can we document or justify it?

¹³ ["Ever since Marconi had invented the 'wireless telegraph,' there had been something mysterious about how it worked." Thomas G. Krattenmaker and Lucas A. Powe, Jr., *Regulating Broadcast Programming* (Cambridge: The MIT Press, 1994) at 33-34.]

¹⁴ This is pretty hyperbolic. Can we make sense of this paragraph?

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¹⁶ [Federal Communications Commission, *Investigation of the Telephone Industry in the United States, Made Pursuant to Public Resolution No. 8, 74th Cong.*, Washington, D.C.: GPO, 1939, Exhibit No. 2096F; Vincent P. Carosso, *The Morgans: Private International Bankers 1854-1913* (Cambridge: Harvard University Press, 1987); Ron Chernow, *The House of Morgan: An American Banking Dynasty and the Rise of Modern Finance* (New York: A Touchstone Book, 1990); Danielian, *AT&T*.]

¹⁷ [Aitken, *Syntony*, 179ff; Dunlap, *Marconi*; Baker, *History of the Marconi Company*; Weightman, *Signor Marconi's Magic Box*; Douglas, *Inventing American Broadcasting*, 3ff; Gleason L. Archer, *History of Radio to 1926* (New York: The American Historical Society, Inc., 1938); Lawrence W. Lichty and Malachi C. Topping, eds., *American Broadcasting: A Source Book on the History of Radio and Television* (New York: Hastings House Publishers, 1976); Alvin F. Harlow, *Old Wires and New Waves: The History of the Telegraph, Telephone and Wireless* (New York: D. Appleton-Century Co.,

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[Burgess: the below chapter summaries occurred originally in CTW's writings. They have also been posthumously transported as headings to his drafts of each chapter.]

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NOTES

What is the difference/conjunction between chains of information and chains of authority? Why did they originally coincide (if they did) and when did they diverge? Where is this going?

Long before the '34 Act, issues of how to protect against the abuse of market power and to foster competition were hotly debated.

1920s decade of electricity coming to American homes. Friedlander, Power & Light

Telecom

- AT&T need for capital & ownership of regional companies in exchange for capital infusions
- State regulation
 - Applicability of previous regulatory models to telephone?
 - Acceptance/push to local and toll monopoly
 - Vail
 - Emergence of commonality among state regulations
- Fading and re-dominance of AT&T vis-a-vis the independents
- Decline of WU and telegraphy
- Vail/AT&T focus on the “system”:
 - control vs profit
 - technology, interstate LD as unifying elements
- Meaningful antitrust?
- Patents, control, system, WEAF, Movietone
- WWI impact
 - Patents, standardization

Wireless

- Invention, novelty, awe vs business viability
- Marconi maritime business, telegraphy, telephony
- Why the shift to continuous wave? Telephony? Power? Spectrum?
- Crystal detector, receiver circuits, vacuum tube
- Government vs private sector ownership
- Recognition of spectrum as resource – first interference, then scarcity
- International interdependence because of spectrum, conferences, etc
- When did the quality of reception get to a useable level? Why?

Broadcasting

- Wireless initially seen as point-to-point telegraph/telephone
- Early broadcasts were technical experiments, not attempts to broadcast to a listening audience.

- Amateurs, improving technology, wide availability, limited enforceability of patents, ...
- 1920: broadcast “materialized”
- 1921: broadcasting “crystallized”
- 1922: broadcasting “took off”
- Conrad, Horne, Davis, KDKA
- Westinghouse, RCA, AT&T, other construction of stations
- Brand name sales, advertising if radios?
- AT&T broadcasting strategy
 - Patents, WEA, other stations, plans
 - Feeds, networks
- Sarnoff finds his way
- NBC, CBS
- Consumer electronics manufacturing, patents
- Evolution & economics of programming
 - Vaudeville, phonograph, movies
 - Purpose, acceptability
 - Economics, timing
- Revenue models
 - None, radio set sales
 - Sponsorship, advertising
 - Government ownership model (1919,1920)
- Regulation & legislation
 - Radio conferences, Hoover
 - 1927, 1934
- NBC/CBS vs AT&T
 - Predecessor to TV development
- Spectrum
 - Broadcasting vs telecom
 - Power, frequencies, time of day, interference
- Public/press recognition
- 1920-1922 boom

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