The Second Information Revolution. *By Gerald W. Brock.* Cambridge: Harvard University Press, 2003. xiv + 322 pp. Index, references. Cloth, $39.95. ISBN 0-674-01178-3.

Reviewed by Thomas Haigh

The Second Information Revolution is essentially two books in one, with chapters interleaved to provide a rough chronology. One recounts the creation, evolution, and deregulation of the telecommunications industry, from the telegraph through the Internet, emphasizing the crucial developments of the 1970s and 1980s. The other is a highly condensed history of computer technology and the computer industry.

Brock opens with the argument that recent upheavals in the telecommunications field, characterized by a dizzying rate of technological change and the introduction of new services, such as cellular wireless and Internet access, constitute a second information revolution. A long and largely stable interlude of regulated monopoly separated this era from the first information revolution, which Brock dates to the nineteenth century and the creation of postal, telephone, and telegraph networks. He attributes the resumption of revolution to the disruptive power of computer technology, incubated outside the cozy world of the Bell System but headed inexorably toward a collision that undermined the assumptions on which regulation was based. Nothing in this outline is controversial, or particularly original. Brock is the first, however, to attempt to present the entire story in an up-to-date and accessible monograph, paying equal attention to its technological and political aspects. He largely accomplishes this, demonstrating an impressive ability to extract material from these different literatures and encapsulate it in accurate, concise summaries.

The chapters dealing with telecommunications policy are very good indeed, and they are the only ones that he chooses to recap and amplify in the conclusion. Brock adopts the sensibilities of institutional economics, examining the relations between government agencies (in this case the Federal Communications Commission and the Department of Justice) and the structure of the industry. His argument here strongly recalls that made by Richard H. K. Vietor in *Contrived Competition* (1994), but it is more

readable and covers more recent developments. Brock is particularly deft in discussing socially constructed assumptions about communications technology that guided different regulatory regimes during the slow course of deregulation, which progressed from natural monopoly, through limited competition on the fringes of the system, to the connection of independently produced equipment to the system, the separation of local and long-distance service, competition for wireless service, the dream of digital convergence, culminating in the rampant competition for local calls that guided the Telecommunications Act of 1996. For each of these transitions, Brock shows that new technology challenged the conceptual underpinning of the existing regime, but did not in itself dictate the new structure of the industry. He quotes and persuasively interprets the relevant passages from regulatory rulings and legal judgments, explains the different interests involved, and avoids excessive detail and arcane jargon. While sympathetic to the motives of regulators, he is not blind to their shortcomings. This is the best overall introduction to telecommunications deregulation I have read.

The chapters on computing are less valuable. Brock admits that the computer industry had very little to do with telecommunications in its early years, which sets up a daunting, and largely unmet, challenge to integrate the two strands of narrative. These sections do provide a creditable précis of a small number of well-known secondary sources on the development of computer technologies and the business history of the computer industry. Readers without any knowledge of the history of computing may find this a useful introduction. Whether covering the early stages, when IBM and Univac dominated the scene, or the later arrival of Microsoft and Netscape, Brock invariably writes clearly and summarizes accurately. The enormous number of firms and technologies of importance to the history of computing are, for the most part, ably defined but are not referred to again. He seems to lack the confidence necessary to strip away elements of the conventional story that are less relevant to his information revolution. The authors comprising his sources wrote without any particular interest in communications, and with a strong focus on hardware. In contrast, Brock's in-depth treatment of IBM's antitrust experiences and technological monopoly, which he contrasts with those of AT&T, emphasizes fundamental differences between the two industries.

Brock's real concern lies, I think, with the infrastructure of telecommunications infrastructure, rather than with information. Indeed, he never defines what he means by information, and he provides no explicit justification for his almost exclusive focus on telecommunications and computing. Though the book opens with a discussion of the nineteenth-century postal service, it makes no reference to technologies such as office machinery, microfilm, Xerox machines, databases, FedEx, or even fax machines. It has nothing to say about information organizations, such as newspapers and libraries, or about other aspects of "information science." It contains, oddly, no reference at all to Claude Shannon, who was not only the creator of information theory but also a communications engineer working for Bell Labs. Readers looking for a broad historical overview of different aspects of the "information revolution" might look instead to Alfred Chandler and James W. Cortada's *A Nation Transformed by Information* (2000).

A fully satisfactory synthesis of the stories of computing and communication will require a better-developed body of studies on the users of both technologies. From the beginning, businesses have integrated what we would now consider the technologies of communication, data storage, and data processing. This process accelerated with the computer as, from the 1950s onward, large firms constructed ad hoc networks to collect and disseminate computer-processed data, including paper forms, telex machines, paper tape and Flexowriters, courier services, punched cards, microfilm, and manually routed messages. Brock's exclusive reliance on a handful of standard monographs to research the history of computing imposes a particular limitation here, confining his discussion of data communications to the origins of underlying technologies (such as packet switching and Ethernet) and key regulatory test cases and legal shifts. For the same reason, Brock has little to say about the commercial time-sharing systems and online information services of the 1970s.

The book would be an excellent choice for a historian of technology or business looking for a concise, accessible, and up-to-date history of telecommunications regulation and deregulation. The interspersed history of computing material should be viewed as a bonus.

Thomas Haigh is assistant professor in the School of Information Studies at the University of Wisconsin, Milwaukee. He holds a Ph.D. from the University of Pennsylvania in the history and sociology of science. He has published articles on the history of the software industry, the origins of the database management system, the historical relationship of computing to corporate management, and the creation of the data-processing department. His current research projects include the social history of the personal computer and the origins of open-source software in the scientific computing field. He is currently the biographies editor of IEEE Annals of the History of Computing.