

Open Standards and the Digital Age  
History, Ideology and Networks  
by  
Andrew L. Russell  
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reviewed by  
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This book, published in 2014, provides a historical perspective on standardization processes and the standards that define communications systems. Starting with telegraph systems (1860s) the author offers a very comprehensive history of communications standardization including the Internet with an emphasis on standards that purport to offer "openness".

As a historian the author does not pick "right" viewpoints but presents what is known. As example, the different concepts of openness are not discussed but are referenced, because there is no common agreement of openness. The author does an excellent job of including the references that have proposed different ideas of what openness might mean. This is the greatest strength of this book. It offers the most complete bibliography of 20<sup>th</sup> Century standards and standardization journal articles, reports, oral histories (some collected by the author) and books this reviewer has seen. The text includes even more references than the bibliography.

Chapters 2 and 3 offer an excellent history of the development of the American standardization system. These Chapters should be required reading for anyone planning to attend a US standardization meeting. The author recognizes that standardization is a process balanced between the ad hoc flexible nature of markets and the hierarchal regimented nature of government and offers the term, "industrial regulation".

Chapter 4 provides a history of standardization in the monopoly Bell System before World War II (the most complete this reviewer has seen). The Bell operating companies, each serving specific markets, had very different requirements than the research groups or manufacturing company (Western Electric). This explains the give-and-take internal standardization process even in an organization (AT&T) that was seen to be monolithic. This history also identifies the separation that AT&T maintained between its internal standardization activities (often considered proprietary) and the growing national standardization organizations (e.g. American Engineering Standards Committee).

Chapter 5. The rise of concerns about the monolithic nature of AT&T prompts the formation of the Federal Communications Commission in 1934 and the first antitrust action against AT&T in 1949. This anti-trust action was settled with the Consent Decree in 1956 which limited AT&T to being a common-carrier. Beginning in this Chapter the history of communications protocol layers 3 (network) and above are presented. As example, this book does not address the physical interface at layer one (RS-232) used to separate early computer and common-carrier systems. RS-232 (~1960) marks the beginning of independent electronic compatibility standards.

Chapter 6 provides the early history of Arpanet and packet-switching offering a good (non-technical) understanding of how the virtual circuit (e.g., CCITT X.25) and datagram (e.g.,

Internet TCP) modes of packet-switching divided communications and computer companies respectively. This chapter does not address the concept of a "spanning layer" (as identified by David Clark [Internet engineer] after the Internet was deployed) which proved to be so important to establishing and maintaining compatibility of the Internet. The spanning layer in the Internet is the Transmission Control Protocol (TCP – layer 3) and aspects of the Internet Protocol (IP) layer 4 above it.

Chapter 7 presents the history of the Open Systems Interconnect (OSI) development in ISO (an international standardization organization) noting the major difficulties that emerged in maintain compatibility between different OSI systems. Such compatibility problems did not occur using the Internet TCP/IP protocols due to fixed spanning layer protocols. The lack of compatibility of the OSI implementations destroyed the credibility of OSI implementations, as the author notes. The options in the OSI layer 3 and 4 (transport) protocols caused the gravest incompatibilities. Such options did not exist in the Internet TCP/IP protocols.

The author explains in concluding Chapters that openness had little to do with the success of the Internet and the reverse might be closer to correct. In summary, this book is the best history of 20<sup>th</sup> Century communications systems and the standardization processes that created them, that is available. The author is to be complemented for presenting clearly and fully what is know and avoiding the more technical and speculative issues of why.