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——商业透视

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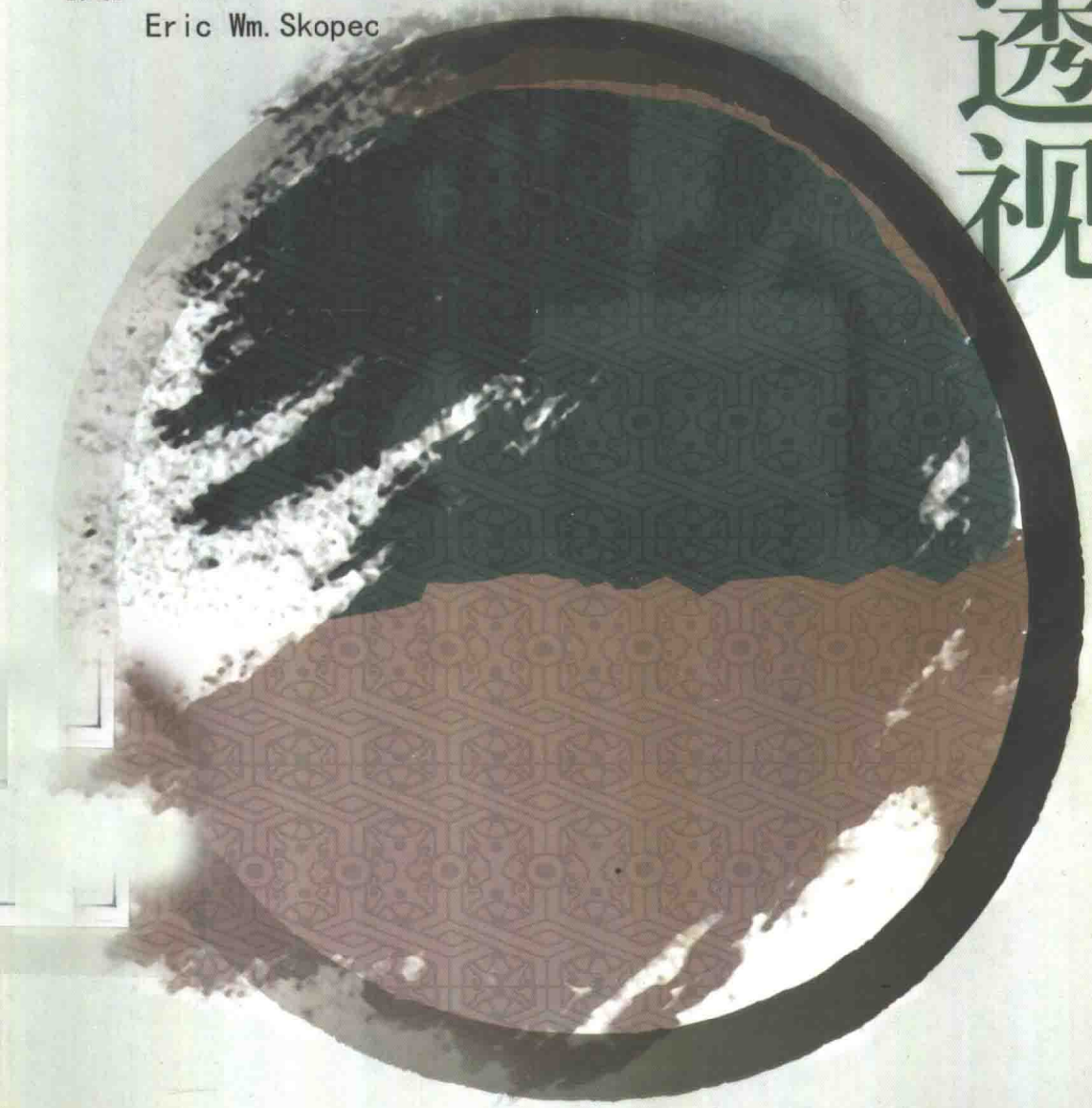

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Global Telecommunications Revolution: The Business Perspective

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PREFACE

Telecommunications is emerging as the dominant industry of our era. With combined sales approaching $1 trillion in 2000 and market capitalization trailing only banking and health care,[1] telecommunications is a rapidly growing, dynamic industry. There is no doubt that telecommunications is where the action is; your decision to study them puts you "in the thick of things."

In the most general terms, telecommunications make up a global industry encompassing a variety of public, private, and state-owned companies whose core business is transporting information, plus companies that produce products and services to support those that transport information. The industry has roots in three older industries with which most readers have abundant experience:

1. Public wireline and wireless telephone networks.
2. Computer networks, such as LANs, and the Internet.
3. Broadcast radio and television coupled with increasingly popular cable networks.

Although the roots of modern telecommunications are easily recognized, their convergence into a multifunctional, globe-spanning industry supporting voice, data, and video transport is truly revolutionary. We are witnessing the emergence of a new industry that will profoundly affect the way we do business and live our lives. The significance of the transformation is evident in the 1997 United Nations declaration that universal access to basic communication and information services is a fundamental human right.[2]

The industry moves rapidly and it is impossible for a textbook to remain current in all areas. Details regarding corporate initiatives and deployment of emerging technologies age quickly. Daily newspapers and information services carry an endless stream of product announcements as well as plans for mergers, acquisitions, and expansions.

[1]International Telecommunication Union, *World Telecommunication Development Report 2000/00*, executive summary available at http://www.itu.ch/ti/publications/world/.

[2]"The Right to Communicate: Declaration on Universal Access to Basic Communication and Information Services," *Global Communications Interactive 1998* (Hanson Cooke Limited, 1998), p. 10.

To compensate, we introduce strategic perspectives, business concepts, and analytic tools to place current developments in important, meaningful contexts.

As the industry evolves, students and their professors must be constantly vigilant to the changes that occur in the technology and in the structure of the business.

In the chapters that follow, we argue that telecommunications have become a core competency for everyone who makes significant business decisions. Once a narrowly defined specialty that was primarily the domain of specialists and technicians, telecommunications is now properly seen as a vital aspect of all businesses ranging from global conglomerates to entrepreneurial start-ups operating out of garages and spare bedrooms.

As telecommunications have moved to center stage, courses in business telecommunications have become increasingly popular, but texts and other educational materials have not kept up with the pace of change. Although there are many fine books on technical aspects of telecommunications, none fully reflects the increasingly central role of telecommunications in business decision making.

Our objective in writing this book is to provide a broad foundation for the next generation of business decision makers. As we write, we see our audience as MBA candidates and advanced undergraduates who will become key decision makers in arenas well beyond the province of traditional corporate MIS departments. Specifically, we are writing for those who will play significant roles in general management, marketing, sales, accounting and finance, operations, and strategy development as well as entrepreneurs, regulators, members of standards bodies, and investors. In all of these roles, knowledge of telecommunications will help readers determine what their company can accomplish, identify new business opportunities, select technologies and strategies, make sense of business and product announcements, and invest responsibly.

Writing for this expanded audience has led us to depart from the standard pattern for business telecommunications texts in two ways.

First, our writing reflects the increasingly global character of business. Regional and even national boundaries are of far less consequence than they once were. Developments in any one country are rapidly replicated around the globe, often with magnified effects. As a result, we focus on global telecommunications. The United States has been the leader in many—but not all—areas, and often provides our frame of reference. However, we integrate developments from overseas as well as interactions between decision-making bodies representing multinational perspectives.

Second, whereas most texts focus on technologies, we place the technologies in a broader context that emphasizes their implications for strategic business decisions as well as the impact of business decisions on development and deployment of new technologies. This view is reflected in a recent edition of *Consulting Matters,* a publication of consulting firm KPMG:

> Technology is becoming a more important driver behind organizational development. In the past, business strategy was viewed as driving everything else, with the IT strategy following. However, these are no longer distinct entities, but two sides of the same coin. Indeed, in some instances IT and the product are inseparable—for example, in the case of on-

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line banking, the technology that provides the delivery mechanism and the product it delivers, have become indistinguishable.[3]

As a result, our coverage of some technologies is lighter than some readers may want. We believe our emphasis on business factors is justified by the increasing centrality of telecommunications in business and the prevalence of fine texts that discuss technologies in great detail.[4]

As you can imagine, our agenda is larger than that of many other textbook authors, and we approach the material in a way that differs from many other business telecommunications textbooks. Understanding existing telecommunications systems as well as emerging technologies and applications is fundamental. However, we believe that understanding their implications for business and the effects of business decisions on development and deployment of new technologies is even more important. As a result, we integrate descriptions of core technologies with underlying business concepts to provide a comprehensive picture of the global telecommunications industry.

This book consists of 12 chapters and two appendixes. The first four chapters introduce general perspectives on business telecommunications. Chapter 1 provides an overview of the industry and describes the revolution in process, and Chapter 2 describes the use of telecommunications to enhance core business processes. Chapter 3 examines telecommunications as an industry worthy of attention in its own right, while Chapter 4 explores the effects of governmental regulation.

Chapter 5 outlines features common to all networks while Chapters 6 through 8 describe public switched telephone networks, local area networks, and wireless networks.

Chapters 9 through 12 examine business trends, including the Internet and electronic commerce (Chapter 9), new business applications (Chapter 10), approaches to capitalizing on changes in the telecommunications industry (Chapter 11), and trends that are reshaping our world (Chapter 12).

The two appendixes contain materials designed to facilitate your study of business telecommunications by showing you how to make the best use of case studies and materials available over the Internet.

To facilitate learning, the chapters include profiles of companies that have a significant impact on the industry, case studies for analysis and discussion, and synopses of relevant business analytic tools. In addition, there is a web site (www-rcf.usc.edu/~housel) supporting use of the text.

ACKNOWLEDGMENTS

No book is solely the creation of its authors, and we claim exclusive credit only for our errors and omissions. Our work has benefited from a continuous flow of ideas, suggestions, and support from students, clients, colleagues, family members, and oth-

[3]*Netscape Business Journal,* October 23, 1998.

[4]Each chapter lists further reading, and our web site will take readers directly to technologically oriented discussions readily available on the Internet.

ers whose contributions we acknowledge with gratitude. Special thanks are due to Professor Anat Hovav at Temple University for assistance with technical matters.

Our students at the University of Southern California, California State University, West Coast University, Learning Tree University and elsewhere have continuously asked the questions needed to refine our focus and direct our efforts in profitable directions.

Simultaneously, clients such as Telecom Italia and Pacific Bell have presented problems worthy of attention and provided support without which our research could not have been conducted. We have also benefited from the works of other scholars and researchers who have described the field and monitored its progress. Their work is recognized in our footnotes and suggestions for further reading.

We have carved the field in our own way, but neither our perspectives nor our directions would have been so sharp without the contributions of others. Throughout this project, friends, colleagues, and family members have tolerated our occasionally—we hope it was only occasional—irascible behavior. Collectively, they provided unstinting social and professional support.

Rick Williamson and his colleagues at McGraw Hill/Irwin have gone above and beyond the call of duty—contributing editorial guidance, consummate good sense, and the gentle prodding needed to bring this work to life.

Finally, reviewers have corrected our excesses and omissions, added valuable insights and ideas, focused attention on the needs of our audience, and reminded us of the requisites for a "teachable" book.

We thank you all!

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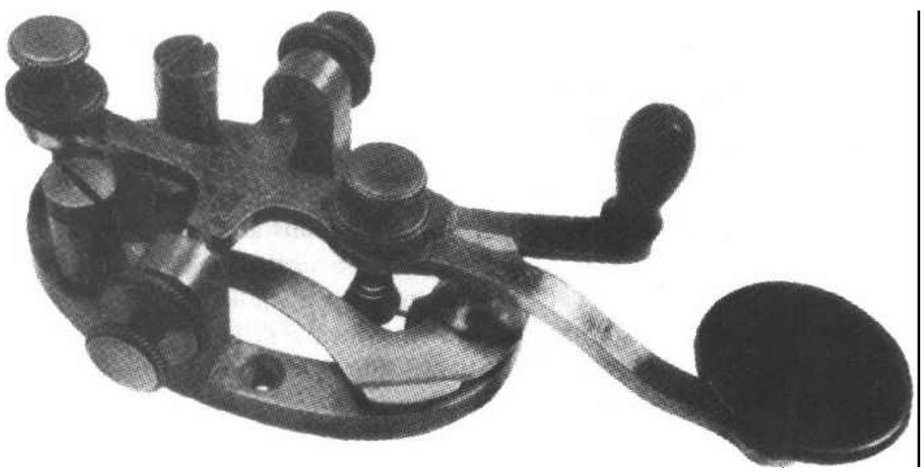
INTRODUCTION: PERSPECTIVES ON BUSINESS TELECOMMUNICATIONS

As far as we can tell, face-to-face communication has been a regular part of our lives as long as our ancestors were recognizably human. The development of writing and the invention of printing presses marked major turning points in our history, but really dramatic events that bring us to the current point took place more recently. Regularly published newspapers were available around the start of the 18th century, and developed countries established postal systems by the end of the same century.

The telegraph was invented in 1837, followed by the telephone in 1875. The era of modern telecommunications began with deployment of the first commercial telephone switchboard in 1878; nearly 1,200 exchanges were created over the next decade.



Radio became a significant factor following the First World War, and regular broadcasts began in 1921. Experimental television stations were in operation by the end of the 1920s; the first commercial TV sets were sold in 1938 with regular broadcasts initiated in 1939. Experimental use of terrestrial microwave transmission for long-distance calls began in 1945, and frequencies were formally allocated in 1948. In 1959 feasibility of commercial satellite links was demonstrated, and INTELSAT, the International Telecommunications Satellite Consortium, was formed in 1964. The Internet, then called ARPANET, was created by the Department of Defense and a handful of university researchers in 1969 and was introduced to the general public at a 1972 demonstration. Cellular telephone service and paging were approved in the United States in 1982—two years after services were launched in Japan—and most U.S. franchises came into existence in 1986.

THE REVOLUTION IN PROCESS

The communication systems just mentioned developed independently. They have remained largely autonomous because none can fully replace its predecessors. Despite virtually ubiquitous telephone networks and the growing popularity of the Internet, we continue to receive significant amounts of information from radio and television broadcasts as well as newspapers and journals delivered by couriers, express services, and postal carriers. As a result, we have grown accustomed to working in an environment characterized by many communication vehicles, each of which provides specific, limited kinds of information. In addition, these systems are "vendor driven": Information providers determine what information will be available and when it will be delivered. For example, local television stations determine when the news will be aired, what stories will be covered, and how much time will be devoted to each.

The telecommunications revolution is fundamentally changing these features. Contemporary technology is dramatically expanding the capacity of communication media while information sources are being consolidated. We can look forward to an environment in which all of the information with which we work is available through one or more high-capacity communication vehicles. Moreover, refined distribution systems make it possible for receivers to decide when information is delivered, what topics are covered, and how much detail is presented. The Internet is the leading exemplar of these changes, but as you will see, even more powerful systems are on the horizon.

Formal terms associated with the revolution include "bandwidth," "convergence," and "push technology." These terms will be explained in the chapters ahead, but for the moment it is important to understand the general features of the revolution. The revolution is changing core assumptions about how communication systems work, what kinds of information are communicated, and who controls the timing and content of information delivery. The result is a whole new paradigm for the distribution and application of information. The principal differences between the "old" and emerging paradigms are summarized in Table 1–1. In our view, responding to these changes and capitalizing on the opportunities they create is essential for the growth, development, and even survival of all businesses.

TABLE 1–1 THE TELECOMMUNICATIONS REVOLUTION: OLD AND EMERGING PARADIGMS

Old assumptions	Emerging opportunities
1. Individual communication vehicles have limited capacity, and each delivers a specific kind of information.	1. High-capacity communication vehicles make it possible to consolidate different information products in relatively few systems.
2. Because each communication vehicle has limited capacity, coping with the world requires use of multiple information sources; users must coordinate the isolated streams of data.	2. Consolidation makes it possible for users to rely on a single information source while resources are coordinated by intelligent programs or "agents" acting on behalf of information users.
3 The content and timing of information delivery systems is controlled by information providers; recipients must accommodate their schedules to those of the vendors.	3. User-driven systems allow receivers to determine what information is delivered and when it is available.

TELECOMMUNICATIONS AS A CORE BUSINESS COMPETENCY

Formally defined, "a core competency is a basis for competitive advantage because it represents a specialized expertise that rivals don't have and cannot readily match."[1] Understanding the emergence of telecommunications as a core competency calls attention to fundamental changes taking place in the very structure of our society.

Management guru Peter Drucker opens a recent book with the observation that we are currently living through a period of extraordinary change. We are, he says, in the process of creating a "post-capitalist society" in which our world will rearrange itself—"its world view; its basic values; its social and political structures, its arts; its key institutions." In Drucker's view, the change is so fundamental that people born 50 years from now will not be able "even to imagine the world in which their grandparents lived and into which their own parents were born."[2]

Placing this transformation in context, Drucker explains that society crosses a "divide" roughly every 200 years. In a capsule history, he describes recent epochs as follows. The 13th century was characterized by the development of cities and creation of social structures supporting an urban lifestyle. Two centuries later, the world witnessed the invention of movable type and the rediscovery of scientific inquiry from antiquity. The combination of these two forces created an era we call the Renaissance.

Drucker dates the next major transformation to 1776. That era, he says, can be understood as the age of "-isms," featuring the Industrial Revolution and development of the dominant ideologies—capitalism and communism—that have shaped the worldview of our parents' generation.

[1]Gary Hamel and C.K. Prahalad, "The Core Competencies of the Corporation Organizations," *Harvard Business Review*, May–June 1990.

[2]Peter F. Drucker, *Post-Capitalist Society* (New York: HarperBusiness, 1993), p. 1.

Finally, Drucker describes the current era as one in which knowledge[3] is the dominant factor shaping and organizing our society:

> The basic economic resource—"the means of production," to use the economist's term—is no longer capital, nor natural resources, . . . nor "labor." *It is and will be knowledge.* The central wealth-creating activities will be neither the allocation of capital to productive uses, nor "labor"—the two poles of nineteenth- and twentieth-century economic theory, whether classical, Marxist, Keynesian, or neo-classical. Value is now created by "productivity" and "innovation," both applications of knowledge to work. The leading social groups of the knowledge society will be "knowledge workers"—knowledge [workers] who know how to allocate knowledge to productive use, just as the capitalists knew how to allocate capital to productive use.[4]

Drucker dates the emergence of this era to the 1960s with the widespread availability of computing powers, and he speculates that we will not complete the transition until 2010 or 2020.

In this context, telecommunications has become central because telecommunications and application of knowledge are inseparably bound to one another. Telecommunications systems are the mechanisms through which knowledge is stored, the vehicles through which it is transmitted, and, increasingly, the means of collaboration that facilitate generation of new knowledge.

Bill Gates of Microsoft coined the term *digital nervous system* to make the same point:

> A digital nervous system is the corporate, digital equivalent of the human nervous system, providing a well-integrated flow of information to the right part of the organization at the right time. A digital nervous system consists of the digital processes that enable a company to perceive and react to its environment, to sense competitor challenges and customer needs, and to organize timely responses. A digital nervous system requires a combination of hardware and software; it's distinguished from a mere network of computers by the accuracy, immediacy, and richness of the information it brings to knowledge workers and the insight and collaboration made possible by the information.[5]

In our view, incremental changes over the last few decades have reached a critical mass, bringing the telecommunications industry to center stage. The industry is growing rapidly and dramatically altering our business and personal lives. Look where you will, and the following conclusions are inescapable:

- Telecommunications applications are fundamentally reshaping the way business is conducted in virtually all industries; emerging systems enhance, refine, and in some cases replace existing ways of doing business.
- Forces of change that affect all industries are manifest most clearly in the telecommunications industry: Globalization, increased competition, deregulation, horizontal and vertical integration, and deployment of new technologies—to name just a

[3]As we use the term, *knowledge* differs from both data and information. *Data* are a numerical or other description of a situation or event. *Information* results from the compilation of data, and *knowledge* reflects mastery of patterns in information as well as the ability to solve problems and recognize opportunities.

[4]Drucker, *Post-Capitalist Society,* p. 8.

[5]Bill Gates, *Business @ The Speed of Thought* (New York: Warner Books, 1999), pp. xvii–xviii.

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