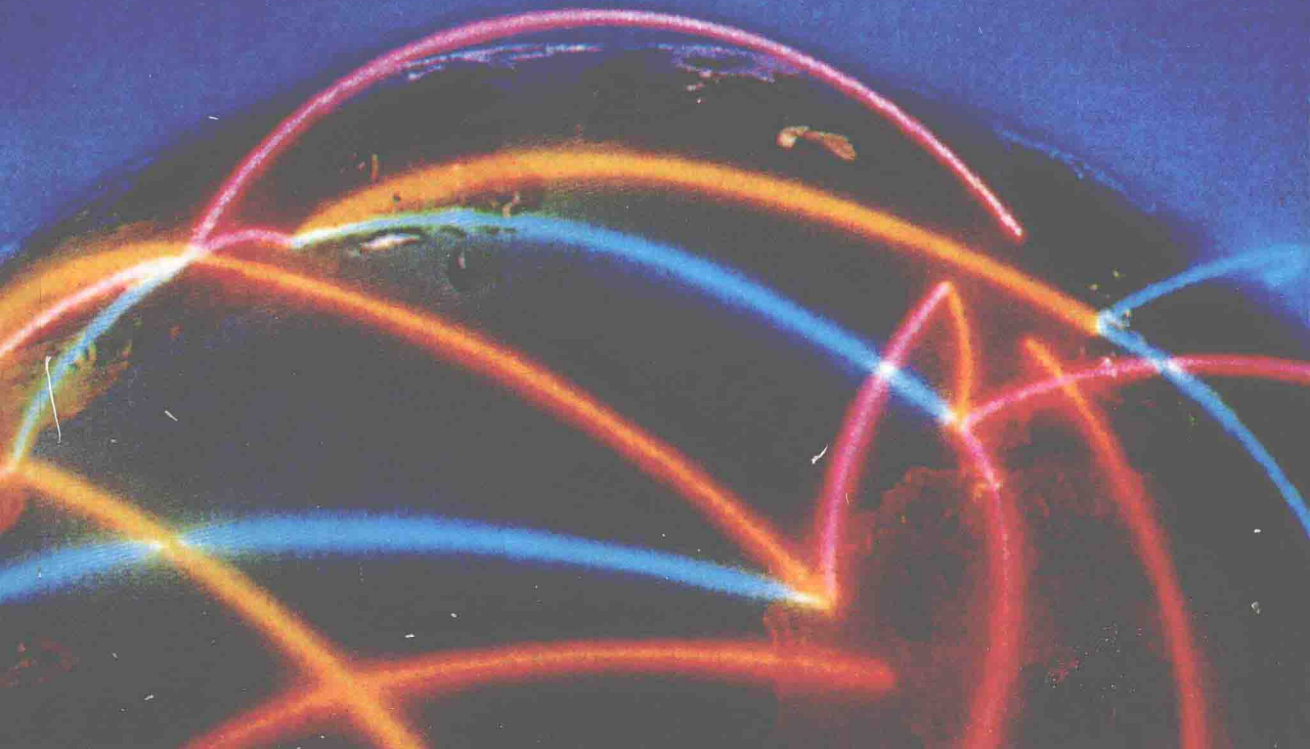


TELECOMMUNICATIONS

CONCEPTS, DEVELOPMENT, AND MANAGEMENT

SECOND EDITION

W. JOHN BLYTH
MARY M. BLYTH



TELECOMMUNICATIONS:

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W. John Blyth
THE DMW GROUP, INC.

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DETROIT COLLEGE OF BUSINESS



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For their commitment to excellence in telecommunications,
we are honored to dedicate this book to:

Thomas Muth of Michigan State University
James Koerlin of Golden Gate University
Dan Dennis of MCI Telecommunications

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PREFACE

Since telecommunications is a dynamic technology, telecommunications textbooks must change to keep pace with new developments in this exciting industry. Since the first edition was published, the telecommunications industry has undergone an unprecedented period of change. These changes are the result of (1) the introduction of competition into the “natural monopoly” of the telephone industry, (2) the breakup of the Bell System, and (3) advancements in technology. Changes as important as these require us to learn more about them in order to use telecommunications equipment and services efficiently.

Telecommunications: Concepts, Development, and Management provides an overview of the broad field of telecommunications, including voice, data, message, and image communications. It emphasizes breadth rather than depth. Each of the major topics in this book could well be the subject of an entire book — or course — on the subject. In fact, books have been written on many of these topics, but most are written for engineers and specialists rather than for students or business users.

Although it is not possible to adequately cover the rapidly expanding field of telecommunications in one volume, we have included all the standard topics, as well as those of special current interest. Our goal is to provide a balanced overview with representative material selected from each area of telecommunications, as seen by experts in the field.

INTENDED AUDIENCE

This book is designed for an introductory course in telecommunications. Written in nontechnical language, it can be used by students without previous training in telephony, electronics, or computer science.

Students in a variety of college and university programs will be able to learn the basic concepts of telecommunications from this book. Businesspersons will be able to learn about telecommunications products and services and their cost-effective management. The book should also be useful to industry professionals who have detailed telecommunications knowledge of a particular segment of the industry but may lack a broader industry perspective. Furthermore, the reference materials (including the comprehensive glossary; the professional associations; the organizations that sponsor seminars; and the telecommunications periodicals, reports, and newsletters) enhance the book’s usefulness to industry professionals.

CHANGES INCORPORATED IN THE SECOND EDITION

Telecommunications: Concepts, Development, and Management, Second Edition, describes the current state of the art in telecommunications. It reflects ideas received from seminar participants, business associates, other instructors, and students. These materials have been field tested by the authors in classroom settings.

This new edition, which builds on the strengths of the previous edition, incorporates the following changes:

- A new chapter has been added to describe the post-divestiture telecommunications industry.
- All appropriate topics have been updated to reflect current status and future trends. There is new or increased coverage on several topics, especially regulation, tariffs, fiber optics, electronic mail, FAX, PBX, teleconferencing, mobile phones, pagers, and videotex.
- Chapter objectives have been added at the beginning of each chapter to help orient readers to the material to be presented.
- A vocabulary section now follows the end of each chapter to call attention to key words and concepts.
- The chapter entitled "Traffic Engineering" has been repositioned so that it precedes the chapters on telecommunications management. Now readers can become familiarized with key traffic engineering terms before they are referred to in operations management.
- A new Appendix C has been added on telecommunications periodicals, reports, and newsletters.
- The bibliography at the end of each chapter has been moved to the back of the book so that all reference materials appear in one place.
- Photographs, bibliography, glossary, and appendices have been updated to reflect the current telecommunications industry.
- A reference list of frequently used acronyms has been added at the end of the book for easy student reference.
- In the Instructor's Guide, new test questions and transparency masters have been added to the existing chapter outlines/lecture notes, answers to review questions, and examination questions.
- A computerized testbank accompanies the Instructor's Guide to provide flexibility in the testing process.

TO THE STUDENT

Welcome to the exciting new world of telecommunications! This book is designed to be your passport into this dynamic field.

ACKNOWLEDGMENTS

We wish to thank the many instructors, students, and professionals who used *Telecommunications: Concepts, Development, and Management*, thereby justifying its revision.

Accurate, up-to-date coverage of a field as broad as telecommunications requires the input of persons with expertise in different segments of the industry. We would like to express our heartfelt appreciation to the following professionals for their contributions and assistance during the preparation of the text: Marvin Pridgeon of Ameritech; William R. Smith of Michigan Bell Telephone Company; Daniel Grove and Scott Davis of Motorola Communications and Electronics; Ralph Carnevale of Compu-gram Information Network; S. Eric Wachtel of MEDphone Corporation; Timothy Beck of Mitsubishi Electric Sales America; Pamela Debandt of Southwestern Bell Telecom; Drusie Demopoulos of Duffey Communications; Cynthia Milton of Northcom Teleport; Glenn Moore, Byrne Blumenstein, Frank Chuba, and Ben Berman of MCI Telecommunications; David Blyth of Century 21 Programming, Inc.; Dennis Blyth and Shawne Buckley of NCR Corporation; C. Stephen Mayo and Jim Hoogesteger of the University of Michigan; Charles Ploof and Jeff Benson of Northern Telecom; Charles Emery of Telecom Technicians, Inc.; Jeanette Tomaszewski and Gerald Lamphere of Detroit College of Business; and Gini Skwiera of Unisys Corporation.

The following reviewers were very helpful with suggestions and comments on the manuscript, and their contribution is much appreciated: Thomas Dunlop, Ohio University; Ron Kapper, College of DuPage; Stan Kroder, University of Dallas; Robert LaRose, Michigan State University; Ruth Lawrence, Start Technical College; Thomas Muth, Michigan State University; and Donald Reicks, Highline Community College.

To the dedicated publishing professionals, we wish to extend our deepest appreciation for their friendship and constant support. Our original editor, Dennis Gladhill, convinced us that we could make a contribution to telecommunications education by our writing. He applauded our progress and cheered us on as work progressed. Glencoe developmental editors John Gastineau and Patricia Parrott applied their publishing expertise to the manuscript and, with careful attention to detail, guided us along the road of turning the manuscript into a finished product. George Provol, who did such a fine job of marketing the first edition, continued to provide us kindly advice and assistance throughout the project.

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CHAPTER

1

INTRODUCTION TO TELECOMMUNICATIONS

CHAPTER OBJECTIVES

After completing this chapter, the reader should be able:

- *To define telecommunications.*
 - *To identify and describe the four principal types of telecommunication systems available today.*
 - *To explain the interrelationship between communications technology and computer technology and describe its effect upon both industries.*
 - *To explain why telecommunications is an essential part of today's business environment.*
 - *To cite several factors that led to the modification of telecommunications policy and the gradual restructuring of the telecommunications industry in the United States.*
 - *To explain why it is important to study telecommunications and have a general understanding of its vocabulary and the role it plays in modern society.*
 - *To describe some of the career opportunities available in today's telecommunications industry.*
-

We are familiar with the telephone. It permits us to communicate with another person nearly anywhere in the world. We know this because we have had firsthand experience with the telephone. When we use the word *telephone*, we can be quite sure that other people know exactly what we mean.