

ANDREW OLIVIERO

CABLING

PART 1 LAN/DATA CENTER NETWORKS AND CABLING SYSTEMS

FIFTH EDITION

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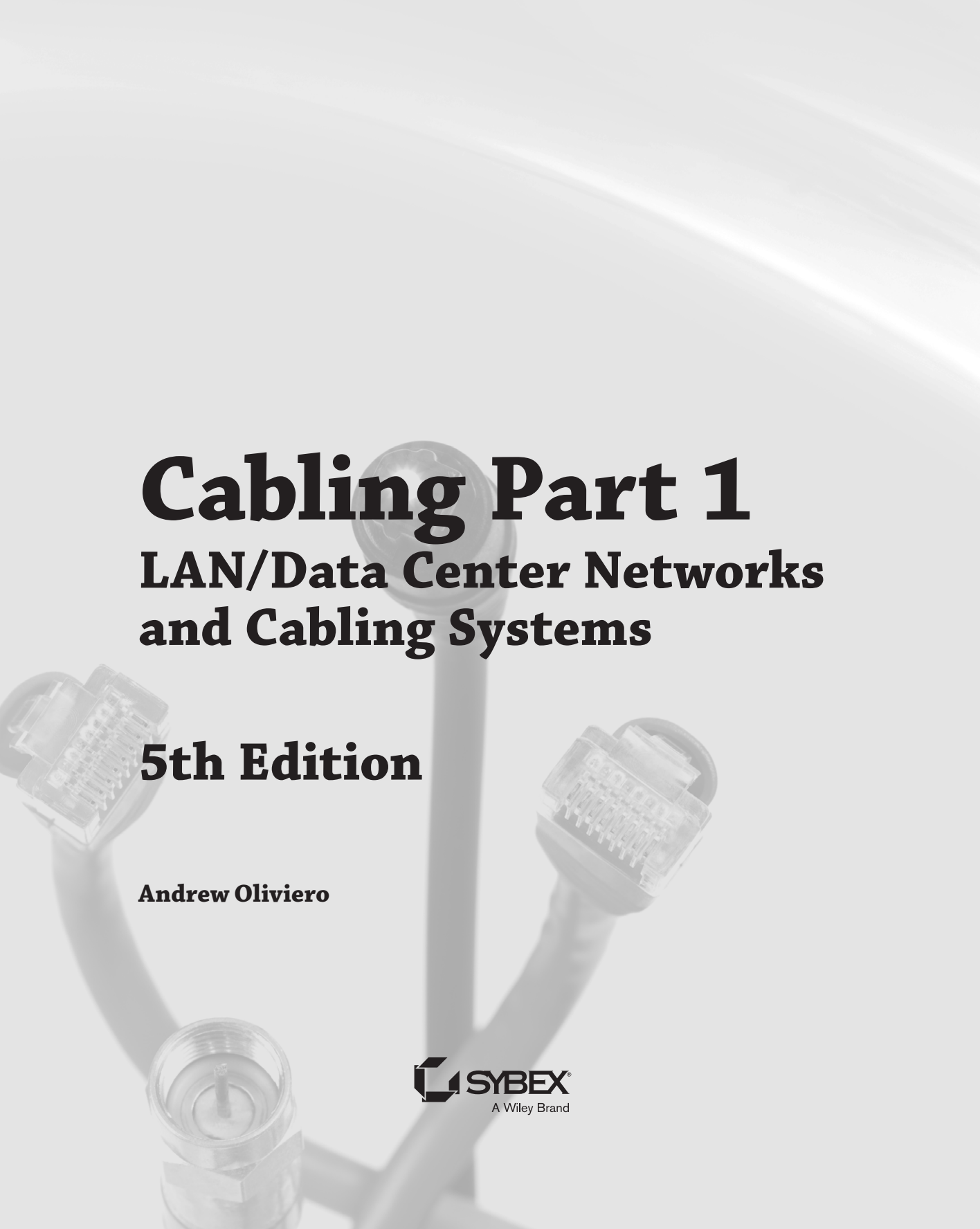
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The background of the cover is a grayscale photograph of network cabling. It features several RJ45 Ethernet connectors and a BNC connector, all arranged in a way that suggests a complex network setup. The cables are dark, and the connectors are light-colored, creating a high-contrast visual. The overall tone is professional and technical.

Cabling Part 1

**LAN/Data Center Networks
and Cabling Systems**

5th Edition



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LAN/Data Center Networks and Cabling Systems

5th Edition

Andrew Oliviero

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A Wiley Brand

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Chris Webb
Associate Publisher, Sybex

In loving memory of my brother Maurice.

And to my parents, Mario and Colomba, and my brother Dominick. Thank you for all of your support, encouragement, and great memories throughout the years. Although we are miles apart, you are with me every step of the way.

—AO

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—Andrew Oliviero

About the Author

Andrew Oliviero is Director of Product Line Management of optical fiber products at OFS (formerly Lucent Technologies), a supplier of optical fiber, cable apparatus, and specialty products. He is responsible for developing global product strategies for the enterprise, FTTX, metro, long-haul, and submarine markets. Andrew is presently focused on new product development for single-mode fiber and is leading OFS's product development teams in developing advanced bend-insensitive single-mode fiber for FTTX, metro, long-haul, and ocean applications.

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Andrew has presented worldwide at a variety of seminars, conferences, and symposiums and is involved in the development of optical fiber and cabling architecture standards in TIA, IEC, ISO, and IEEE. He is an active member of TIA's TR-42 committee, where he was involved in the development of the ANSI/TIA-568-C standard, 10Gbps multimode fiber specifications, and measurement processes. He held the Chair position of TIA's Fiber Optic LAN Section in 2007.

Andrew holds a B.S.E. and Ph.D. in chemical engineering from the University of Pennsylvania and the University of Massachusetts, respectively.

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Introduction

Welcome to the incredibly interesting world of local area networks and premises data communications cabling systems. This introduction will tell you a little about how this book came about and how you can use it to your best advantage.

Not only does cabling carry the data across your network, it can also carry voice, serial communications, alarm signals, video, and audio transmissions. You may take this for granted, but communications networks have created a new way of living. We can learn remotely, chat with anyone in the world who is connected to the Internet, and conduct commerce all over the world in a way that has never been done before. Consider yourself lucky to be part of this “communications revolution.”

One thing that continues to be certain is the increasing demand for more bandwidth. In the past, people took their cabling systems for granted. However, over the last decade the information technology world has continued to understand the importance of a reliable and well-designed structured cabling system to efficiently support this explosion in bandwidth demand. This period also resulted in an explosion in the number of registered structured-cabling installers. The number of people who need to know the basics of cabling has increased dramatically.

A significant amount of research, writing, and editing has gone into bringing this book into its current edition. Many distributors, manufacturers, and cabling contractors have provided feedback, tips, and in-the-field experiences along the way and made this book both technically rigorous and practical at the same time.

During the research phase of the book, newsgroups, cabling FAQs, and other Internet resources were continually reviewed to find out what people want to know about their cabling system. In addition, technology managers, help desk staff, network designers, cable installers, and system managers also contributed feedback. Most importantly, the five major standards organizations—the Telecommunications Industry Association (TIA), the International Telecommunications Union (ITU), the International Organization for Standardization (ISO), the International Electrotechnical Commission (IEC), and SAE International—have provided the most up-to-date standards on optical fiber, fiber-optic cable, and testing.

About This Book

This book's topics run the gamut of LAN networks and cabling; they include the following:

- ◆ An introduction to data cabling
- ◆ Information on cabling standards and how to choose the correct ones
- ◆ Cable system and infrastructure constraints
- ◆ Cabling system components
- ◆ Tools of the trade
- ◆ Copper, fiber-optic, and unbounded media
- ◆ Network equipment
- ◆ Wall plates and cable connectors
- ◆ Cabling system design and installation
- ◆ Cable connector installation
- ◆ Cabling system testing and troubleshooting
- ◆ Creating request for proposals (RFPs)
- ◆ Cabling case studies

A cabling glossary is included at the end of the book so you can look up unfamiliar terms. The Solutions to the Master It questions in The Bottom Line sections at the end of each chapter are gathered in Appendix A. Five appendixes include resources for cabling information, tips on how to get your Registered Communications and Distribution Designer (RCDD) certification, information for the home cabler, a discussion of USB/1394 cabling, and information about ETA's line of cabling certifications.

Who Is This Book For?

If you are standing in your neighborhood bookstore browsing through this book, you may be asking yourself whether you should buy it. The procedures in this book are illustrated and written in English rather than "technospeak." That's because this book was designed specifically to help unlock the mysteries of the telecommunications room, cable in the ceiling, wall jacks, and other components of a cabling system in a simple, easy-to-follow format. This field is critical to ensuring that we continue to evolve in an "electronic" and "connected" age. We want this to be an interesting experience as opposed to a boring one. LAN networks and cabling can be a confusing topic; it has its own language, acronyms, and standards. We designed this book with the following types of people in mind:

- ◆ Information technology (IT) professionals who can use this book to gain a better understanding and appreciation of a structured cabling system
- ◆ IT managers who are preparing to install a new computer system

- ◆ Do-it-yourselfers who need to install a few new cabling runs in their facility and want to get it right the first time
- ◆ New cable installers who want to learn more than just what it takes to pull a cable through the ceiling and terminate it to the patch panel
- ◆ Students taking introductory courses in LANs and cabling
- ◆ Students preparing for the ETA fiber optic installer (FOI), fiber optic technician (FOT), or data cabling installer (DCIC) certifications

In addition, this book is an excellent reference for anyone currently working in data cabling.

How to Use This Book

To understand the way this book is put together, you must learn about a few of the special conventions that were used. Here are some of the items you will commonly see.

Italicized words indicate new terms. After each italicized term, you will find a definition.

TIP *Tips* will be formatted like this. A tip is a special bit of information that can make your work easier or make an installation go more smoothly.

NOTE *Notes* are formatted like this. When you see a note, it usually indicates some special circumstance to make note of. Notes often include out-of-the-ordinary information about working with a telecommunications infrastructure.

WARNING *Warnings* are found within the text whenever a technical situation arises that may cause damage to a component or cause a system failure of some kind. Additionally, warnings are placed in the text to call particular attention to a potentially dangerous situation.

KEYTERM *Key terms* are used to introduce a new word or term that you should be aware of. Just as in the worlds of networking, software, and programming, the world of cabling and telecommunications has its own language.

SIDEBARS

This special formatting indicates a sidebar. *Sidebar*s are entire paragraphs of information that, although related to the topic being discussed, fit better into a standalone discussion. They are just what their name suggests: a sidebar discussion.

CABLING @ WORK SIDEBARS

These special sidebars are used to give real-life examples of situations that actually occurred in the cabling world.

Enjoy!

Have fun reading this book—it has been fun writing it. I hope that it will be a valuable resource to you and will answer at least some of your questions on LANs and cabling. As always, I love to hear from readers; you can reach Andrew Oliviero at andrewoliviero9@gmail.com.