
Preface

Once upon a time, back in the early Packetozoic,¹ Ethernet was simple and easy to configure. There was only one media system, based on a heavy-duty “thick” coaxial cable, and the configuration rules for that system could be listed in a couple of sentences. As Ethernet caught on and became steadily more popular, clever engineers extended the capabilities of Ethernet again and again. They invented thin coaxial Ethernet, and twisted-pair Ethernet, and fiber optic Ethernet. Not content with that, they invented the 100 megabit per second variety of Ethernet.

This wide range of media systems provides enormous flexibility and make it possible to design an Ethernet LAN to fit virtually every circumstance. However, all this flexibility does have a price: the varieties of Ethernet media each have their own bits and pieces of equipment and their own configuration rules, which makes the system a lot more complex than things were in the old days. This book helps deal with the complexity by listing the official configuration rules in a set of self-contained chapters that are designed as quick reference guides to the territory.

1. An era that lasted roughly from the origins of experimental Ethernet until the invention of new media varieties in the 1980s.

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The rules in this book can all be found in the Ethernet standards for each media system. However, the formal standards are not usually stocked in bookstores. To help make things simpler, this book collects the configuration rules in one place, which means that you don't have to pay high prices to buy the standards documents and then wade through the formal standards language trying to extract all of the rules yourself.

The intent of this book is to answer typical questions about Ethernet configuration, including the maximum segment length for a given media type, and the rules for linking segments together. This is not a general guide on how to use Ethernet equipment or how to design networks, nor does it explain how to build cables and media systems. While there is a small amount of tutorial information included, most of what you will find here is page after page of Ethernet configuration rules, including all those three-letter acronyms² that the computer industry seems to thrive on.

What This Book Includes

This book describes the configuration rules for seven media varieties from the official IEEE Ethernet standard. For the original 10-Mbps system, this includes the following media varieties:

- 10BASE5 thick coax
- 10BASE2 thin coax
- 10BASE-T twisted-pair
- 10BASE-FL fiber optic

For the 100-Mbps Fast Ethernet system, this includes the following varieties:

- 100BASE-TX twisted-pair
- 100BASE-T4 twisted-pair
- 100BASE-FX fiber optic

2. Called TLAs, of course.

A few standard and non-standard media varieties have been developed over the years that have not seen wide usage. They are not covered in this book. The varieties from the IEEE standard that are not covered include the broadband cable variety (10BROAD36), which was designed for use over cable TV systems, and the 1-Mbps twisted-pair variety (1BASE5), which is a slower twisted-pair system that never became widely used.

There have also been a number of vendor-specific innovations developed over the years that are not part of the official standard and that operate at various speeds. Examples of vendor-specific systems include 5-Mbps broadband cable segments as well as several wireless channels. These vendor-specific systems are not covered in this guide because they are not part of the formal specifications, and are therefore not described in the official configuration guidelines.

How to Use This Book

If you know which variety of media segment you're interested in, you can jump right to the chapter that describes the configuration rules for it. Also, Appendix A provides a summary of the 10-Mbps segment rules, and Appendix B provides a summary of the 100-Mbps segment rules.

This book begins with a brief Ethernet tutorial which describes the basic operation of the Ethernet system, and those features of the system that are common to all media varieties. Following the tutorial are two sets of chapters, one covering the 10-Mbps and the other covering the 100-Mbps media varieties.

The chapters on the 10-Mbps media segments begin with a chapter which introduces the 10-Mbps media system, describing the features that are common to all 10-Mbps media segments. Similarly, the chapters on 100-Mbps Fast Ethernet segments begin with a chapter which introduces the 100-Mbps media system, and that describes the features common to all 100-Mbps media segments.

The chapters on individual media segments follow these introductory chapters. Each variety of 10-Mbps and 100-Mbps Ethernet media segment is briefly described in a separate chapter, including the configuration guidelines for a single segment of the media type being described.

At the end of the individual media segment chapters are chapters on the multi-segment configuration guidelines for the 10-Mbps and 100-Mbps systems. These chapters describe how multiple segments that operate at a given speed may be combined to form larger Ethernet systems. The media segment chapters and the multi-segment configuration chapters are designed as self-contained references. For that reason, some small portions of text are repeated in these chapters.

If you want to link Ethernet segments that operate at different speeds you must use a bridge or switching hub, therefore Chapter 15 briefly describes how bridges and switching hubs work.

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