Network Warrior

—思科网络工程师必备手册（影印版）

第二版

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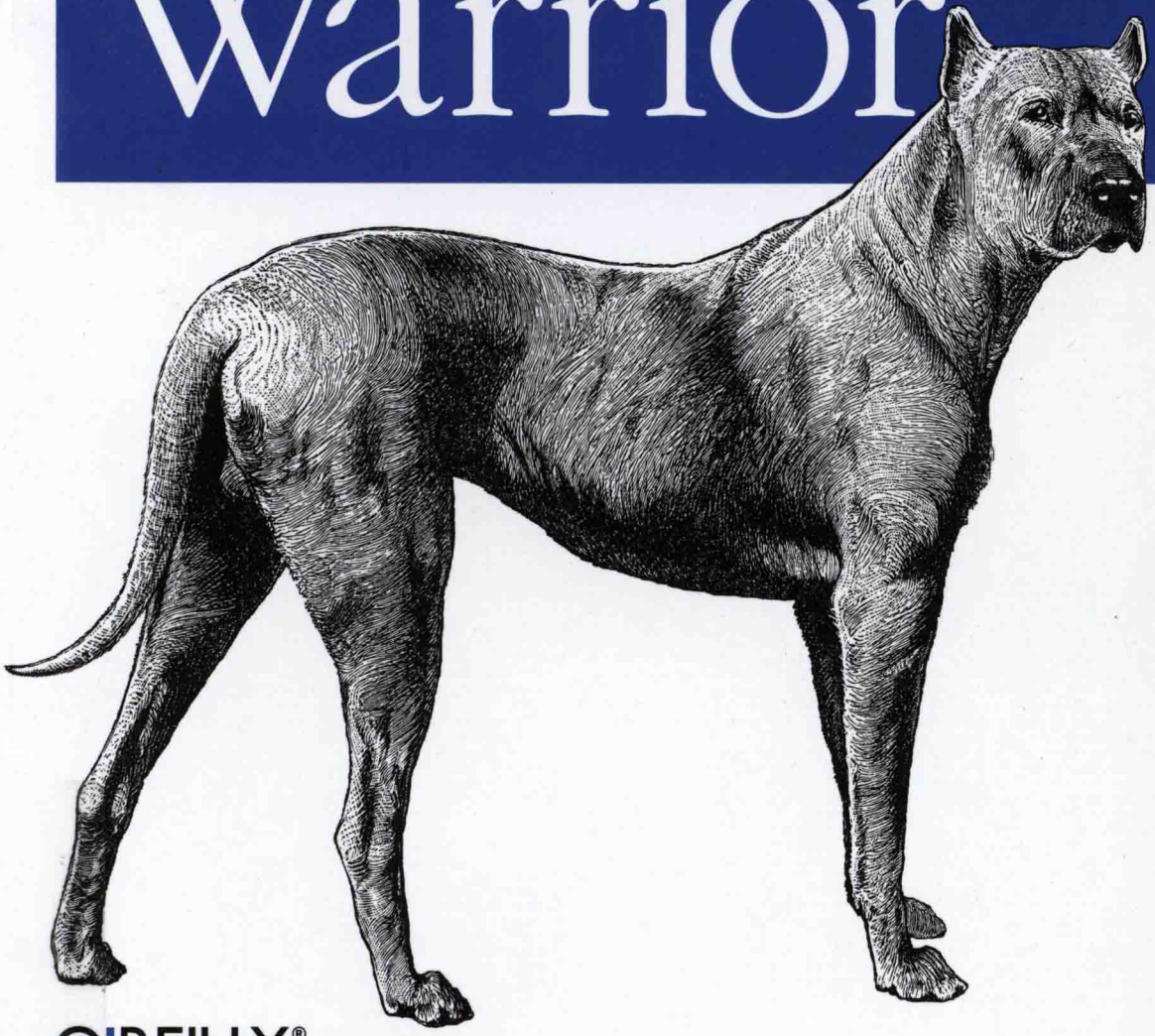
Network Warrior



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Gary A. Donahue 著

（第2版）

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Gary A. Donahue

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Preface

The examples used in this book are taken from my own experiences, as well as from the experiences of those with or for whom I have had the pleasure of working. Of course, for obvious legal and honorable reasons, the exact details and any information that might reveal the identities of the other parties involved have been changed.

Cisco equipment is used for the examples within this book and, with very few exceptions, the examples are TCP/IP-based. You may argue that a book of this type should include examples using different protocols and equipment from a variety of vendors, and, to a degree, that argument is valid. However, a book that aims to cover the breadth of technologies contained herein, while also attempting to show examples of these technologies from the point of view of different vendors, would be quite an impractical size. The fact is that Cisco Systems (much to the chagrin of its competitors, I'm sure) is the premier player in the networking arena. Likewise, TCP/IP is the protocol of the Internet, and the protocol used by most networked devices. Is it the best protocol for the job? Perhaps not, but it is the protocol in use today, so it's what I've used in all my examples. Not long ago, the Cisco CCIE exam still included Token Ring Source Route Bridging, AppleTalk, and IPX. Those days are gone, however, indicating that even Cisco understands that TCP/IP is where everyone is heading. I have included a chapter on IPv6 in this edition, since it looks like we're heading that way eventually.

WAN technology can include everything from dial-up modems (which, thankfully, are becoming quite rare) to T1, DS3, SONET, MPLS, and so on. We will look at many of these topics, but we will not delve too deeply into them, for they are the subject of entire books unto themselves—some of which may already sit next to this one on your O'Reilly bookshelf.

Again, all the examples used in this book are drawn from real experiences, most of which I faced myself during my career as a networking engineer, consultant, manager, and director. I have run my own company and have had the pleasure of working with some of the best people in the industry. The solutions presented in these chapters are the ones my teams and I discovered or learned about in the process of resolving the issues we encountered.

I faced a very tough decision when writing the second edition of this book. Should I keep the CatOS commands or discard them in favor of newer Nexus NX-OS examples? This decision was tough not only because my inclusion of CatOS resulted in some praise from my readers, but also because as of this writing in early 2011, I'm still seeing CatOS switches running in large enterprise and ecommerce networks. As such, I decided to keep the CatOS examples and simply add NX-OS commands.

I have added many topics in this book based mostly on feedback from readers. New topics include Cisco Nexus, wireless, MPLS, IPv6, and Voice over IP (VoIP). Some of these topics are covered in depth, and others, such as MPLS, are purposely light for reasons outlined in the chapters. Topics such as Nexus and VoIP are vast and added significantly to the page count of an already large and expensive book. I have also removed the chapters on server load balancing, both because I was never really happy with those chapters and because I could not get my hands on an ACE module or appliance in order to update the examples.

On the subject of examples, I have updated them to reflect newer hardware in every applicable chapter. Where I used 3550 switches in the first edition, I now use 3750s. Where I used PIX firewalls, I now use ASA appliances. I have also included examples from Cisco Nexus switches in every chapter that I felt warranted them. Many chapters therefore have examples from Cat-OS, IOS, and NX-OS. Enjoy them, because I guarantee that CatOS will not survive into the third edition.

Who Should Read This Book

This book is intended for anyone with first-level certification knowledge of data networking. Anyone with a CCNA or equivalent (or greater) knowledge should benefit from this book. My goal in writing *Network Warrior* is to explain complex ideas in an easy-to-understand manner. While the book contains introductions to many topics, you can also consider it a reference for executing common tasks related to those topics. I am a teacher at heart, and this book allows me to teach more people than I'd ever thought possible. I hope you will find the discussions both informative and enjoyable.

I have noticed over the years that people in the computer, networking, and telecom industries are often misinformed about the basics of these disciplines. I believe that in many cases, this is the result of poor teaching or the use of reference material that does not convey complex concepts well. With this book, I hope to show people how easy some of these concepts are. Of course, as I like to say, "It's easy when you know how," so I have tried very hard to help anyone who picks up my book understand the ideas contained herein.

If you are reading this, my guess is that you would like to know more about networking. So would I! Learning should be a never-ending adventure, and I am honored that you have let me be a part of your journey. I have been studying and learning about computers, networking, and telecom for the last 29 years, and my journey will never end.

This book does not explain the OSI stack, but it does briefly explain the differences between hubs, switches, and routers. You will need to have a basic understanding of what Layer 2 means as it relates to the OSI stack. Beyond that, this book tries to cover it all, but not like most other books.

This book attempts to teach you what you need to know in the real world. When should you choose a Layer-3 switch over a Layer-2 switch? How can you tell if your network is performing as it should? How do you fix a broadcast storm? How do you know you're having one? How do you know you have a spanning tree loop, and how do you fix it? What is a T1, or a DS3 for that matter? How do they work? In this book, you'll find the answers to all of these questions and many, many more. I tried to fill this book with information that many network engineers seem to get wrong through no fault of their own. *Network Warrior* includes configuration examples from real-world events and designs, and is littered with anecdotes from my time in the field—I hope you enjoy them.

Conventions Used in This Book

The following typographical conventions are used in this book:

Italic
: Used for new terms where they are defined, for emphasis, and for URLs

`Constant width`
: Used for commands, output from devices as it is seen on the screen, and samples of Request for Comments (RFC) documents reproduced in the text

`Constant width italic`
: Used to indicate arguments within commands for which you should supply values

`Constant width bold`
: Used for commands to be entered by the user and to highlight sections of output from a device that have been referenced in the text or are significant in some way

Indicates a tip, suggestion, or general note

Indicates a warning or caution

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Acknowledgments

Writing a book is hard work—far harder than I ever imagined. Though I spent countless hours alone in front of a keyboard, I could not have accomplished the task without the help of many others.

I would like to thank my lovely wife, Lauren, for being patient, loving, and supportive. Lauren, being my in-house proofreader, was also the first line of defense against grammatical snafus. Many of the chapters no doubt bored her to tears, but I know she enjoyed at least a few. Thank you for helping me achieve this goal in my life.

I would like to thank Meghan and Colleen for trying to understand that when I was writing, I couldn't play. I hope I've helped instill in you a sense of perseverance by completing this book. If not, you can be sure that I'll use it as an example for the rest of your lives. I love you both "bigger than the universe" bunches.

I would like to thank my mother—because she's my mom, and because she never gave up on me, always believed in me, and always helped me even when she shouldn't have (Hi, Mom!).

I would like to thank my father for being tough on me when he needed to be, for teaching me how to think logically, and for making me appreciate the beauty in the details. I have fond memories of the two of us sitting in front of my RadioShack Model III computer while we entered basic programs from a magazine. I am where I am today largely because of your influence, direction, and teachings. You made me the man I am today. Thank you, Papa. I miss you.

I would like to thank my Cozy, my faithful Newfoundland dog who was tragically put to sleep in my arms so she would no longer have to suffer the pains of cancer. Her body failed while I was writing the first edition of this book, and if not for her, I probably

would not be published today. Her death caused me great grief, which I assuaged by writing. I miss you my Cozy—may you run pain free at the rainbow bridge until we meet again.

I would like to thank Matt Maslowski for letting me use the equipment in his lab that was lacking in mine, and for helping me with Cisco questions when I wasn't sure of myself. I can't think of anyone I would trust more to help me with networking topics. Thanks, buddy.

I would like to thank Jeff Fry, CCIE# 22061, for providing me temporary access to a pair of unconfigured Cisco Nexus 7000 switches. This was a very big deal, and the second edition is much more complete as a result.

I would like to thank Jeff Cartwright for giving me my first exciting job at an ISP and for teaching me damn-near everything I know about telecom. I still remember being taught about one's density while Jeff drove us down Interstate 80, scribbling waveforms on a pad on his knee while I tried not to be visibly frightened. Thanks also for proofreading some of my telecom chapters. There is no one I would trust more to do so.

I would like to thank Mike Stevens for help with readability and for some of the more colorful memories that have been included in this book. His help with PIX firewalls was instrumental to the completion of the first edition. You should also be thankful that I haven't included any pictures. I have this one from the Secaucus data center...

I would like to thank Peter Martin for helping me with some subjects in the lab for which I had no previous experience. And I'd like to extend an extra thank you for your aid as one of the tech reviewers for *Network Warrior*—your comments were always spot-on and your efforts made this a better book.

I would like to thank another tech reviewer, Yves Eynard: you caught some mistakes that floored me, and I appreciate the time you spent reviewing. This is a better book for your efforts.

I would like to thank Sal Conde and Ed Hom for access to 6509E switches and modules.

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I would like to thank Mike Loukides, my editor, for not cutting me any slack, for not giving up on me, and for giving me my chance in the first place. You have helped me become a better writer, and I cannot thank you enough.

I would like to thank Rachel Head, the copyeditor who made the first edition a much more readable book.

I would like to thank all the wonderful people at O'Reilly. Writing this book was a great experience, due in large part to the people I worked with at O'Reilly.

I would like to thank my good friend, John Tocado, who once told me, "If you want to write, then write!" This book is proof that you can change someone's life with a single sentence. You'll argue that I changed my own life, and that's fine, but you'd be wrong. When I was overwhelmed with the amount of remaining work to be done, I seriously considered giving up. Your words are the reason I did not. Thank you.

I cannot begin to thank everyone else who has given me encouragement. Living and working with a writer must, at times, be maddening. Under the burden of deadlines, I've no doubt been cranky, annoying, and frustrating, for which I apologize.

My purpose for the last year has been the completion of this book. All other responsibilities, with the exception of health and family, took a back seat to my goal. Realizing this book's publication is a dream come true for me. You may have dreams yourself, for which I can offer only this one bit of advice: work toward your goals, and you will realize them. It really is that simple.

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