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The Codelivly Foundation Series

NETWORK ENGINEER

LEVEL 1

The Complete Foundation Guide to Networking, Troubleshooting & Real-World Network Engineering



Written by Rocky

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Network Engineer: L1

The Complete Foundation Guide to Networking,
Troubleshooting & Real-World Network Engineering

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Dedication

To every self-taught learner troubleshooting their own Wi-Fi at 2 a.m., convinced they broke the Internet.

You didn’t. It was DNS.

Preface

Most networking books fail beginners in one of two ways. Either they drown you in theory, forty pages on the OSI model before you have ever pinged anything, or they hand you commands to memorize with no idea of what those commands actually do to the bits on the wire. Both approaches produce the same result: someone who can pass a quiz but freezes the first time a real user says “the Internet is down.”

This book takes a different path. Every topic follows the same arc: first the *problem* the technology exists to solve, then the *mechanism* by which it solves it, then the *commands* that let you see it working, and finally the *failures* you will meet in real life and how to diagnose them. You will subnet by hand until it is reflex. You will read ARP tables, DHCP exchanges, and routing tables the way an engineer reads them. You will work through thirty realistic troubleshooting scenarios and twelve labs that you can build for free on your own computer.

The goal is not to make you sound like a network engineer. It is to make you able to *work* as one: to sit down at an unfamiliar network, form a hypothesis, test it, fix the fault, and write it up so the next person benefits. That skill, the disciplined loop of observe, hypothesize, test, verify, document, is worth more than any certification, and it is the thread that runs through every part of this book.

Read it in order the first time. Do the labs. Attempt every practice question before reading its answer. By the final assessment you will not just know networking; you will trust yourself with it.

Rocky
Codelivly, 2026

Acknowledgments

A book like this is never a solo effort, even when one name sits on the cover.

Thank you to the **Codelivly community**: the readers, learners, and practitioners whose questions, corrections, and "okay, but *why* does it work like that?" messages shaped what this book explains and how it explains it. The best sections of this book began as answers to your questions.

Thank you to the engineers and mentors who taught the habits this book passes on: change one thing at a time, read the logs before you touch the config, and write it down so the 3 a.m. version of your colleague can fix it without you.

Thank you to the maintainers of the open tools this book leans on, Wireshark, GNS3, and the wider open-source networking ecosystem, for making a professional-grade lab something anyone can build for free.

And thank you, reader, for choosing to learn this properly. Networks run the world quietly. Welcome to the profession that keeps them running.

About Codelivly

Codelivly is a technical learning platform focused on practical cybersecurity, networking, IT fundamentals, and hands-on labs. Rather than teaching theory in isolation, Codelivly material is built around the way skills are actually used on the job: real commands, real troubleshooting workflows, and lab exercises you can reproduce on your own hardware.

This book is part of the **Codelivly Foundation Series**, guides designed to take a motivated beginner to genuine job readiness in a single, self-contained volume.

You can find more guides, labs, and learning resources at **codelivly.com**.

About the Author

Rocky is a technical writer and instructor at Codelivly who focuses on networking and cybersecurity fundamentals. His teaching approach centers on first principles: understanding *why* a technology exists and *what actually happens on the wire*, then reinforcing that understanding with labs, packet captures, and troubleshooting practice. This book reflects that philosophy. Every chapter moves from concept, to mechanism, to hands-on verification.

How to Use This Book

This book is designed to be worked through, not just read. Here is how to get the most from it.

Read in order the first time. The parts build on each other. Subnetting (Part III) assumes IPv4 (Chapter 7); VLANs assume switching; routing assumes subnetting. After a first pass, the book works well as a reference.

Do the labs. Part X describes how to build a free home lab using virtualization and network simulation. Every lab lists its requirements, steps, and verification. You will learn more from one hour of lab work than from three hours of reading.

Attempt every question before reading the answer. The subnetting drills, the practice bank, and the final assessment only build skill if you struggle first. Wrong answers followed by understanding are the fastest way to learn.

Use the scenarios as rehearsal. Part IX contains thirty realistic faults. Read each symptom, pause, and decide what *you* would check first, then compare against the investigation shown. This is interview preparation and job preparation at the same time.

Keep the Quick Reference nearby. The cheat sheets near the end of the book are built for daily use: print them, keep them open in a tab, and let them fade out of use as the material becomes memory.

Follow the roadmap. The 30/60/90-day plan at the back sequences everything in this book into a realistic study schedule for someone learning alongside work or school.

A note on examples: sample command output in this book is illustrative, reconstructed to show the *shape* of real output so you know what to look for. Addresses use documentation and private ranges. Where syntax is vendor-specific (for example, Cisco-style CLI), it is labeled as such; concepts transfer across vendors even when keystrokes differ.

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