

# A Vendor-Agnostic Guide to Network Engineering

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Networking is the invisible infrastructure that powers modern life. Every message, video call, online purchase, and eight-hour binge of *The Office* relies on the concepts described in this series.

This is Part 1: the welcome mat. What this series is, who it's for, how it's structured, and why “vendor-agnostic” isn't just a buzzword slapped on the title.

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**Level:** Beginner to Intermediate · **Prerequisites:** Basic computer literacy · **Assumed Knowledge:** None required — concepts are introduced progressively, but the series reaches CCNA-level depth

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## What This Series Is

This is a 70-part series covering everything a network engineer needs to understand, starting at the foundational level. It spans the core concepts that every network—from a home office to an enterprise environment—relies upon:

- How devices communicate
- How data navigates across the internet
- How networks are designed and structured
- How traffic is secured and prioritized
- How automation is changing the field

Each post focuses on one specific topic, building progressively from fundamentals toward more advanced concepts. By the end, you'll have a thorough understanding of how networks actually work—not just which buttons to click.

## Series Structure

This series is structured around the current **CCNA 200-301** exam objectives.

*“But wait! What if the only hardware I have is from Juniper? I thought you said this was vendor-agnostic??”*

Fret not. It is.

The CCNA exam, despite being a leading Cisco certification, covers networking fundamentals that apply universally. Cisco didn't invent Ethernet, TCP/IP, OSPF, or VLANs. These are industry standards defined by independent organizations like the **IEEE** and the **IETF**. The CCNA exam tests

your understanding of *these standards*—Cisco just happens to be the vendor administering the test.

Think of it like learning how to drive. The concepts—steering, braking, traffic laws—are universal. It doesn't matter if you drive a Prius or a Ferrari; the skills transfer. Of course, there are nuances. Just as the driving mechanics differ dramatically between a Prius and a Ferrari, the way you interact with a routing table will vary between a Cisco and a Juniper router.

The CCNA structure provides an excellent learning framework because:

1. **It's comprehensive** — It covers the full breadth of foundational networking topics.
2. **It's well-organized** — Topics build on each other in a logical progression.
3. **It's industry-recognized** — Whether or not you pursue the certification, employers understand what “CCNA-level knowledge” means.
4. **It's relevant** — The exam evolves with the industry, something needed now more than ever.

## What “Vendor-Agnostic” Actually Means

Throughout this series, you will notice a consistent approach:

### STANDARDS, NOT SYNTAX

When we talk about VLANs, I'll explain the IEEE 802.1Q standard that defines how VLAN tagging works—not what it may be called by a specific vendor or how to configure it with that vendor's CLI. Every switch vendor on the planet implements this standard. Understanding 802.1Q means you understand VLANs. Period.

### ”WHY” BEFORE THE “HOW”

The top 20 results for any networking topic tell you what to type. They don't tell you why it works. I hate this.

This series takes the opposite approach: “*Here's why this works.*”

Once you understand why STP exists, it doesn't matter if you're working with hardware from Arista or TP-Link. You can troubleshoot any vendor's equipment. You might need to look up the specific syntax, but you'll know what you're looking for.

### OPEN STANDARDS

Instead of citing vendor documentation, references will point to:

- **IEEE standards** (e.g., 802.1Q, 802.3)
- **IETF RFCs** (e.g., RFC 2328 for OSPF, RFC 791 for IP)
- **Industry best practices**
- **Real-world implementations** across a myriad of platforms

## **ACKNOWLEDGING VENDOR DIFFERENCES WHERE THEY MATTER**

Ignorance is not bliss. Sometimes vendors do things differently. When that becomes relevant to the topic at hand, I'll note it—not to explain five different syntaxes, but to show that variations exist.

### **Who This Series Is For**

#### **CCNA CANDIDATES**

If you're studying for the CCNA exam, this series covers every exam objective in depth. You'll still want hands-on lab practice with actual Cisco equipment, but the conceptual foundation you build here will make that practice far more effective. You'll understand *why* you're typing those commands, not just *what* to type.

#### **THOSE BREAKING INTO THE FIELD**

Starting your networking career? This series assumes no prior knowledge. Every technical term is explained when first introduced. Analogies, visual representations, and live examples bridge the gap between everyday experience and networking concepts.

#### **EXPERIENCED IT PROFESSIONALS**

While this series is beginner-friendly, it also serves as a technical refresher for seasoned engineers. You may have configured VLANs countless times, yet never thoroughly explored the frame-level mechanics of 802.1Q tagging.

#### **STUDENTS**

Whether in a formal networking program or self-studying, this series provides structured learning with real-world context. Each post stands on its own but also builds toward a comprehensive understanding.

### **How the Series Is Organized**

The series follows the six domains of the CCNA 200-301 exam, with posts broken out by sub-topic where depth warrants separation:

- **Domain 1:** Network Fundamentals
- **Domain 2:** Network Access
- **Domain 3:** IP Connectivity
- **Domain 4:** IP Services
- **Domain 5:** Security Fundamentals
- **Domain 6:** Automation and Programmability

## What Each Post Includes

Every post in this series follows a consistent structure:

### CONCEPT EXPLANATION

The “what” and “why” are explained in plain language. Analogies connect concepts to everyday experience. I won’t oversimplify, but I also won’t make assumptions about what domains you hold knowledge in.

### TECHNICAL DEEP-DIVE

Details matter. How does this actually work at a technical level? What’s happening in the packets? What do the standards specify?

### DIAGRAMS, VISUALIZATIONS, AND DEMONSTRATIONS

Networking is inherently visual. Diagrams map out concepts and practical demonstrations show them in action. Seeing exactly how a frame traverses a switched network is often more valuable than reading the RFC.

### FOOTNOTES

As with most engineering disciplines, networking is full of edge cases, exceptions, and “well, actually” moments. Rather than cluttering or confusing the main text, these are explained in footnotes. They’re there for the curious and the thorough—skip them if you want the core concepts.

### REFERENCES

I’ll link the authoritative sources—RFCs, IEEE standards, vendor-neutral documentation. The sources that you may trust more than a 23-year-old on the internet 😊.

## A Note on Simplification and Accuracy

This is a learning resource, not a reference manual.

I will occasionally simplify. When first learning how Spanning Tree works, you don’t need to know every variant, every edge case, every vendor-specific implementation of the protocol. You need to understand the core concept: why loops are bad and how STP prevents them.

I’ll acknowledge these simplifications in footnotes.

Think of it like learning calculus. You don’t start with Real Analysis<sup>1</sup>. You discover that a derivative is a slope and an integral is the area under a curve. Later, you learn about limits, Riemann sums, and epsilon-delta proofs. The simplified version wasn’t wrong—it was appropriate for where you were in your academic journey.

That said, I am only human. While I aim to distinguish between helpful simplification and technical error, mistakes can happen. If you spot an inaccuracy—whether it’s a typo, an oversimplification, or a concept I’ve misrepresented—please reach out so I can correct it.

## Key Takeaways

1. **This series covers the full scope of foundational networking:** 70 posts, structured around the six domains of the CCNA 200-301 exam, from fundamentals through automation.
2. **Vendor-agnostic means standards-first:** The focus is on IEEE, IETF, and industry standards—not vendor-specific syntax. The concepts transfer to any platform.
3. **Understanding “why” beats memorizing “how”:** If you know *why* a protocol exists, you can troubleshoot any vendor’s implementation of it.
4. **Simplifications are intentional and marked:** When something is simplified for clarity, it’s acknowledged in footnotes. Simplification is not inaccuracy—it’s pedagogy.
5. **No prior knowledge is assumed:** Technical terms are defined when introduced. The series is designed to be accessible to beginners while remaining useful to experienced engineers.

*In Part 2, we start with the device at the center of every network: the router—what it does, why it exists, and how it moves packets between networks.*

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## References

- Cisco Systems. (2024). *CCNA Exam Topics (200-301 v1.1)*. Cisco Learning Network. [Link](#)
- IEEE Standards Association. (2018). *IEEE 802.1Q-2018 — Bridges and Bridged Networks*. IEEE. [Link](#)
- IEEE Standards Association. (2022). *IEEE 802.3 — Ethernet*. IEEE. [Link](#)
- Moy, J. (1998). *OSPF Version 2*. RFC 2328, IETF. [Link](#)
- Postel, J. (1981). *Internet Protocol*. RFC 791, IETF. [Link](#)
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## Footnotes

1. The calculus analogy isn’t perfectly parallel. Math prerequisites are strictly hierarchical—you genuinely cannot do integration without understanding derivatives. Networking is less rigid: you can configure VLANs without fully understanding STP, and many “advanced” topics are accessible without mastering every foundational concept first. The analogy holds for the learning philosophy (start simple, add nuance later), not for the dependency structure. ↵
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