
DATAKOM AND NETWORKING FOR NON-ENGINEERS

A two-day intensive course on the fundamentals of data communications and IP networking... in plain English.

Datacom and Networking for Non-Engineers is a two-day intensive course specifically designed to explain the fundamentals of data communications and IP networking to non-engineers.

Without bogging down on details, we will bust the buzzwords, explain the jargon, understand the main technologies, and most importantly, the underlying ideas... and how it all fits together.

Taking this course, you will get the solid core knowledge base needed for all kinds of communications going forward... plus detailed course books that will be an invaluable reference for years to come.

You will build *structured knowledge* that lasts a lifetime, the key concept-level knowledge that you can't get on the job, from reading articles or talking to vendors.

Thousands of people from organizations including Cisco, Intel and Microsoft, CIA, NSA, IRS, FAA and FBI, the US Army, Navy, Air Force, Marines and Coast Guard, AT&T, Verizon, Sprint, Bell Canada, Comcast, Cox, Rogers, many equipment manufacturers, and many big telecom users including banks, insurance companies and all levels of government who needed to be more effective in understanding and dealing with telecom and networking technology have benefited from our training.

This training - and our superb instructors - consistently receive rave reviews on evaluations. Many attendees tell us they wish they'd had this course years ago!

Register online at www.teracomtraining.com or call us toll-free: 1-877-412-2700

Course Outline

Day 1

1. “DATA” COMMUNICATIONS CONCEPTS

We'll start at the beginning with the fundamentals, with the ITU model for data circuits, the components in the model, and practical examples of circuit configurations including LANs and WANs. This chapter serves as an introduction to topics that will be covered in the rest of the course.

- A. Convergence: Treat Everything Like Data
- B. Data Circuit Model
- C. Data Terminal Equipment (DTE)
- D. Analog and Digital Data Circuits
- E. Data Circuit-Terminating Equipment (DCE)
- F. Point-to-Point Circuits
- G. Multidrop Circuits
- H. LANs
- I. Wide Area Networks
- J. Representing Bits on Cables

2. CODING, FRAMES AND PACKETS

Next, we'll put in place a solid understanding of the key concepts of IP packets and LAN frames, ensuring a solid foundation on which to build an understanding of IP packets, Ethernet MAC frames, routers, networks and the Internet. We'll begin with a quick review of binary and hexadecimal to ensure everyone is up to speed.

- A. Essential Functions
- B. Representing Quantities: Decimal, Binary and Hex
- C. Character Coding: ASCII and Unicode
- D. Start/Stop/Parity
- E. Frames
- F. Packets
- G. Packets and IP Addresses vs. Frames and MAC Addresses
- H. IP Packets

3. THE OSI LAYERS AND PROTOCOL STACKS

There are so many functions that must be performed to interoperate systems, a structure is required to organize the functions so that separate issues can be treated separately, the ISO Open Systems Interconnection 7-Layer Reference Model. You'll learn what a layer is, the purpose of each layer, examples of protocols like TCP and IP used to implement layers, and understanding how it all works together for applications from electrical meter readings to web surfing, VoIP and Skype.

- A. Protocols and Standards
- B. ISO OSI Reference Model
- C. OSI 7-Layer Model
- D. Physical Layer: 802.3, DSL, DOCSIS
- E. Data Link Layer: 802 MAC
- F. Network Layer: IP and MPLS
- G. Transport Layer: TCP and UDP
- H. Session Layer: POP, SIP, HTTP
- I. Presentation Layer: ASCII, Encryption, Codecs
- J. Application Layer: SMTP, HTML, English ...
- K. Protocol Stack in Operation: Babushka Dolls
- L. Standards Organizations

4. LAYER 2: ETHERNET, LANS AND VLANS

Ethernet is now used everywhere for the point-to-point links that actually make up a network. In this chapter, you will learn the basic principles of Ethernet and LANs, how it was formalized in the 802 series of standards, the crucial concepts of MAC addresses and MAC frames, LAN cables and the important concept of a broadcast domain. You'll understand how LAN switches, also called Layer 2 switches, connect devices, and how VLANs separate devices.

- A. MAC Addresses, MAC Frames and Broadcast Domains
- B. Ethernet and 802 standards
- C. LAN Cables and Categories
- D. Ethernet / Layer 2 Switches
- E. VLANs

Day 2

5. IP NETWORKS, ROUTERS AND ADDRESSES

We begin understanding why devices have IP address and how they communicate using IP packets with the simplest framework, a private network, to understand routing and bandwidth on demand. We'll understand what a router is, and why they were called gateways. Then we will cover IPv4 addressing: IPv4 address classes, static vs. dynamic addresses and DHCP, public and private addresses and NAT, and how TCP and Ports fit into the story. To finish, we'll quickly cover the upcoming IPv6 addresses.

- A. Simplest IP Network Example: Routers Connected with Dedicated Lines
- B. Routers and Customer Edge (CE)
- C. IPv4 Address Classes
- D. DHCP
- E. Public and Private IPv4 Addresses
- F. Network Address Translation
- G. IPv6
- H. IPv6 Address Allocation and Address Types
- I. TCP, UDP, Ports and Sockets
- J. Multicast
- K. IPv6

6. ROUTING BASICS

In this chapter, we'll cover the very basic ideas behind routing: how the router decides which way to go. We'll cover routing tables, subnets, and the essential idea of assigning subnets to groups of machines. The chapter is finished with a lesson on MPLS and how it relates to IP routing.

- A. What is a Gateway?
- B. The Basic Ideas Behind Routing
- C. Subnets and CIDR
- D. Prefix and Subnet Mask
- E. Assigning Subnets to Broadcast Domains
- F. Routing Tables
- G. Autonomous Systems, OSPF and BGP
- H. MPLS vs. IP

7. WIRELESS IP: WI-FI AND BLUETOOTH

Sensors and controllers can be connected with radio links. In this chapter, we'll cover the most commonly-used technology for short-range wireless: WiFi.

- A. WiFi standards & speeds
- B. Hotspots and SSIDs
- C. Voice over IP over WiFi
- D. WiFi security
- E. Smartphone WiFi hotspots
- F. Bluetooth

8. FIBER OPTICS

Sensors and controllers can be connected with fiber. In this chapter, we'll cover the fundamentals of what fiber is, how it works and how it is deployed.

- A. Fundamentals of fiber & fiber cables
- B. Wavelengths, single-mode and multimode
- C. WDM: Wave-Division Multiplexing
- D. Metropolitan Area Networks / Campus Networks
- E. PON: Passive Optical Network

9. DSL AND CABLE MODEMS

A lucky few small business and residential customers have fiber to the premise. The rest use cable modems on Hybrid Fiber-Coax or broadband networks, or DSL modems on twisted pair loops. In this chapter, we'll understand DSL and cable modem access to the Internet on copper.

- A. Twisted-Pair Outside Plant
- B. CATV Hybrid Fiber-Coax Plant
- C. Fiber to the Neighborhood
- D. DSL & DSLAMs for twisted pair
- E. VDSL for TV over twisted pair
- F. Cable Modems

10. THE INTERNET AND THE INTERNET OF THINGS

The Internet has pervaded into every aspect of communications, not only for people web surfing, snap chatting, using Facebook and watching youTube, but for communication between machines. We finish with a review of what exactly the Internet is, who runs it, who pays for it, and the idea of the Internet of Things.

- A. The Inter-Net
- B. Domain Name System
- C. Internet Service Providers (ISPs)
- D. IP Interconnect: IXs, transit and peering
- E. The Internet of Things (IoT)

Here's What Seminar Attendees Like You Are Saying

Hundreds of people like you have benefited from Teracom training. Many tell us this was their best course ever; filled gaps in their knowledge and tied everything together... knowledge they've been needing for years. Others on course their first week on the job remarked "what a wonderful way to get started in the business."

Here's a sampling of comments from Teracom alumni:

"Feedback from my team was TERRIFIC. It gave our entire technical Call Center a common foundation, and you seem to have crafted that perfect balance between technical depth, real-world applications, and lively delivery. I couldn't be happier with the results. The things my team learned from this training were applied in real-world situations almost immediately."

- Rusty Walther, Vice President, Client Services, AboveNet Communications

"Excellent! I learned a lot - everyday terms, definitions, and acronyms. Seminar notebook very helpful. The instructor was the best I ever had - lots of knowledge and experience and stories were GREAT."

- Serena Laursen, Microsoft

"The selection of material - the order of its presentation - the way it was presented... incredibly effective at presenting concepts and ideas - uses great analogies and stays on topic."

- Susan Lennon, Nortel

"The seminar delivered exactly what was advertised, at a very high quality.

Truth in advertising!" - Gary Lundberg, Copper Mountain Networks

Whether you work for an organization that produces telecom, datacom or networking products or services; or you buy these products and services - or just have to get up to speed on what all the rest of them are talking about when they say "SIP trunking", "Ethernet", "MAC frame", "4G, MPLS or VPN..."

"Best course we have ever had onsite at 3Com"

"Perfect content; well organized, well paced, building block approach, resulted in a very nice cathedral" - Jim George, Qualcomm

"Course was excellent! One of the best I have taken. Extremely well organized and presented. Seminar workbook is outstanding - a very valuable reference" - Kieran Delaney, Maritime Life

"I liked most the use of analogies to explain complex concepts. It delivered exactly what the brochure promoted. Gave me a thorough understanding so I feel more confident."

- Judith Myers, Ameritech

"Excellent! Tied the individual pieces of knowledge together into a picture... was interactive and built up the knowledge layers properly." - Jim Geiss, Qwest

"Filled in a lot of gaps in my knowledge of networking... able to deliver the knowledge effectively and entertainingly. Excellent seminar"- Kirk Kroeker, IEEE Computer Society

"Great information that I will be able to use at work. Very easy to understand all the information especially the IP networking part. I wouldn't change a thing"

- Orlando Jasso, AboveNet Communications.

"Layman's terms with humor was very relaxing - helped me concentrate... understanding is now CLEAR ... the manual will be very helpful" - Linda Côté, Bell Canada

"Best instructor I have had on a course - excellent explainer in layman terms, not techie terms"

- Susan Coleman, Bell Sygma

"Best course materials ever; the full text descriptions are invaluable.

Course filled in so many gaps for me. Bravo!" - Ross Brooks, Vertek

"Outstanding! The best I've encountered, and I've attended many seminars."

- Bob Gibbons, WMX Technologies

Six Reasons to Take This Course

Teracom's courses have been taught to wide acclaim across North America since 1992 and are designed for the **non-engineering professional** needing to fill in the gaps, build a solid base of knowledge... and see how it all fits together.

1. Cut through the buzzwords, jargon and vendor hype to gain a structured understanding of data communications and networking, allowing you to make meaningful comparisons and informed decisions... knowledge skills you can put to use today and in the future.
2. Get up to speed on the latest developments and trends. This course is totally up to date with SIP trunking, VoIP, 4G, Optical Ethernet, MPLS and more, providing far more benefit than outdated courses.
3. Get a solid base of vendor-independent knowledge of technologies, service providers, standard practices and mainstream solutions that you can build on.
4. Learn more with instructor-led training, where you can interact and ask questions – the best kind of training you can get – and instructors consistently rated “excellent” on student evaluations.
5. Obtain course books with detailed text notes that will serve as a valuable reference for years.
6. Understand how it all fits together.

Develop a structure for understanding technologies and solutions, allowing you to make informed choices and meaningful comparisons -- knowledge you can't get on the job, reading trade magazines or talking to vendors.

Course Schedule

We're constantly adding new dates. To see the latest schedule, please visit teracomtraining.com.

How to Register

Space in our seminars is limited, and may sell out, so please register as early as possible to reserve your place. Register online at teracomtraining.com, or call us at 1-877-412-2700. You will receive a registration package with full details and instructions plus a confirmation letter to sign and fax back to complete your registration.

Tuition Fees

Attendance at a scheduled public session of this course \$795. per person. Discounts are available for multiple registrations, and for private group sessions.

Free Bonus! Online Courses & TCO CTNS Certification

As a free bonus, you get the full set of Teracom's Online Courses. Not only are these an excellent way to take a second pass through various topics, the Online Courses include pictures of equipment and additional lessons beyond those in this course. If you choose to write the optional course exams, and pass, you will also earn the TCO CTNS certification, complete with certificate suitable for framing and letter of reference.

Your Course Materials: An Invaluable Reference

Every course comes complete with a high-quality course book that's been called the best on-the-job reference tool around. Written in plain English, this easy-to-use reference includes copies of all graphics PLUS extensive detailed text notes. Topics are organized in logical groups to give you easy reference after the seminar to the practical experience, theoretical background, and unbiased information on industry technologies, products and trends you'll need. With numerous chapters covering all major topics, you'll obtain an invaluable resource impossible to find anywhere else in one book.

Get a sneak preview of the course materials via the tutorials at www.teracomtraining.com.

Bring This Course To Your Location

Since 1992, we have provided high-quality on-site training in telecommunications, data communications, IP, networking, VoIP and wireless at Bell Labs, Qualcomm, 3Com, Cisco, Intel, Verizon, AT&T, Alcatel, Jabil, Nortel, Teleglobe, MindSpring, APEX Telecom, Equifax, Transamerica Insurance, The Hartford, Bell Canada, Bell Mobility, TELUS, Frontier Communications, SDN Communications, City of San Francisco, Shaw, Shentel, Western Iowa Telephone, American Broadband, Cap Gemini, MicroCell Telecom, TDS Telecom, Kyocera, Wells Fargo, Winstar, Western Wireless, US Cellular, Ericsson/Hewlett-Packard, Bloomberg, Department of Homeland Security, the NSA, Office of Naval Intelligence, Defense Systems Information Agency, Spawar, ComSec Establishment, US Coast Guard, US Air Force, General Accounting Office, GSA, Intelsat, RangeTel, Alltel, Vertek, DSCI, Cox Cable, Rogers, Florida Power and Light, Idaho Power, Entergy, New York Power Authority, Genuity, LG Electronics, Panasonic, SouthEast Telephone, State of Nebraska, State of Montana, Ketchikan Public Utilities, L-3 Communications, NOAA, Tektronix, Canadian Army and Air Force, Bermuda Telecom, UTS, and the Universal Service Administrative Company... to name a few.

Plus, we have a GSA contract with pre-approved government pricing.

Onsite training has special advantages:

- Your personnel will be up to a common speed with a solid knowledge base.
- We'll fill in the gaps and put in place productivity-enhancing structured understanding of telecom and networking fundamentals, wireless, TCP/IP, MPLS, VoIP... to meet your requirements..
- The seminar will be a strong team-building exercise.
- Significant reductions in training costs are often achieved.
- Each student receives a detailed workbook / textbook that will be a valuable reference for years to come.
- Pre- and post-training testing is available, including team results on a spreadsheet

We have built a solid reputation for delivering high-quality private team-training programs that are a resounding success. We'd like to do the same for you! Please contact us at 1-877-412-2700 for more information.

About the Author



Eric Coll is an international expert in telecommunications, data communications and networking and has been actively involved in the industry since 1983. He holds Bachelor of Engineering and Master of Engineering (Electrical) degrees.

Mr. Coll has taught telecommunications technology training seminars to wide acclaim across North America since 1992, and has broad experience working as an engineer in the telecommunications industry. He has worked for Nortel's R&D labs as a design engineer on projects including digital voice and data communications research and digital telecom network equipment design, and on satellite radar systems, consulting on Wide Area Network design, and many other projects in capacities ranging from detailed design and implementation to systems engineering, project leader and consultant.

In addition to being founder and Director of Teracom Training Institute, Mr. Coll provides consulting to the telecommunications industry, specializing in telecommunications technology R&D and as a Subject Matter Expert in tax matters.