

# TELECOM, DATACOM AND NETWORKING FOR NON-ENGINEERING PROFESSIONALS

*An intensive three-day modular course covering all major topics in telecom, datacom and networking.*

Telecom, Datacom and Networking for Non-Engineering Professionals is our "core training" - an intensive three-day course designed for non-engineering professionals, to get you up to speed on virtually all aspects of telecom, datacom and networking, from fundamentals and jargon to the latest technologies.

Thousands of people from organizations including Cisco, Intel and Microsoft, the CIA, IRS, FAA, and FBI, all branches of US Armed Forces, Verizon, AT&T, TELUS and Qwest, Wells Fargo, Bank of America, TD Bank, Oneida Tableware, the Portland Trailblazers and hundreds of others who needed to be more effective in understanding and dealing with telecom and networking technology have benefited from this course.

The content, its order, our analogies and explanations have been refined over the course of *sixteen years*... and we constantly update it.

- We start at the beginning of the story, progress through it in a logical order, and finish at the end.
- We bust the buzzwords, explain the jargon, and more importantly, the ideas and concepts behind the jargon: key concept-level knowledge that you can't get on the job, from magazines or vendors.
- Covering the topics in a systematic way, we build *structured knowledge* that lasts a lifetime.

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

<p><b>Course Objectives</b></p> <ul style="list-style-type: none"> <li>• Establish a solid base in the fundamentals of telecom, datacom and networking.</li> <li>• Fill in the gaps. Understand jargon and buzzwords.</li> <li>• Understand mainstream technologies and solutions.</li> <li>• Put a structure in place that project-specific knowledge can be built on in the future.</li> <li>• Understand how it all fits together.</li> <li>• Develop career-enhancing knowledge skills.</li> </ul>	<p><b>Course Content (High-Level Summary)</b></p> <p><b>Part 1: Fundamentals of Telecommunications</b></p> <ul style="list-style-type: none"> <li>• The telephone network, loops and trunks, POTS</li> <li>• Analog, the voiceband, SS7</li> <li>• LECs, CLECs, IXCs, POPs and telecom industry</li> <li>• IVRs, ACDs, modems, DSL, call centers</li> <li>• Digital: DS0, DS1, DS3, T1, SONET, optical, DWDM</li> <li>• Overview of wireless: cellular, 3G, LTE, Wi-Fi</li> </ul> <p><b>Part 2: Understanding Data Communications</b></p> <ul style="list-style-type: none"> <li>• Datacom basics: DTEs, DCEs, LANs and WANs</li> <li>• IP packets, LAN frames; ASCII, binary and hex</li> <li>• All about modems: voiceband, DSL, cable, wireless</li> <li>• Digital data services and equipment</li> <li>• All about LANs: Ethernet, hubs, switches, routers</li> </ul> <p><b>Part 3: Understanding IP and Networking</b></p> <ul style="list-style-type: none"> <li>• OSI model, layers, protocol stacks, standards</li> <li>• IP addresses: static/dynamic, public/private, NAT</li> <li>• Routers, bandwidth on demand and packet networks</li> <li>• TCP/IP over Frame Relay; ATM</li> <li>• MPLS and Quality of Service (QoS)</li> <li>• TCP/IP over MPLS</li> <li>• Voice over IP</li> <li>• The Internet: ISPs, DNS, HTML, the Web</li> <li>• Practical networking solutions</li> </ul>
<p><b>Prerequisites</b></p> <p>None</p>	
<p><b>Who should attend</b></p> <ul style="list-style-type: none"> <li>• This course is for those needing to fill in the knowledge gaps, understand the buzzwords and jargon, popular technologies like T1 and TCP/IP, and more importantly, understand the ideas behind these technologies and understand how it all fits together.</li> <li>• Ideal FOR NON-ENGINEERING PROFESSIONALS who are in need of a solid knowledge base to be more effective in dealing with technology projects and technical personnel.</li> </ul>	
<p><b>Tuition Fees</b></p> <p>Value priced at only US\$1395 for the three-day course. Compare to \$1999+ for lower quality elsewhere.</p>	

Register online at [www.teracomtraining.com](http://www.teracomtraining.com) or call us toll-free: 1-877-412-2700

## Here's What Seminar Attendees Like You Are Saying

Hundreds of people like you have benefited from Teracom's training. Many tell us their Teracom course was their best course ever; filled gaps in their knowledge and tied everything together... knowledge they've been needing for years. 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 "DS1", "Ethernet frame", "TCP/IP over Frame Relay", "MPLS", "VPN" or "firewall"...

*"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 a Teracom 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 the big picture view of communications and networking you can put to use today ... and into the future.
2. Build the career-enhancing knowledge tools you need to succeed in the fast-changing world of communications.
3. Build a structural understanding of telecommunications and networking, allowing you to make meaningful comparisons and informed decisions.
4. Understand mainstream solutions to today's requirements, and obtain templates you can put to immediate use.
5. Obtain detailed workbooks / textbooks 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 and locations for public presentations of Teracom's very popular courses to our schedule. To see the latest schedule, please visit our web site at [www.teracomtraining.com](http://www.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. You can register online or by phone:

- Register online at [www.teracomtraining.com](http://www.teracomtraining.com).
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Tuition Fees	US Courses (US\$)	Canadian Courses
<b>Telecom, Datacom and Networking for Non-Engineering Professionals</b>	<b>3 days \$1395</b>	<b>C\$1395</b>

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## **FREE! Telecom 101 Textbook**

Register for this course today, and you will receive a free electronic copy of Teracom's highly-acclaimed 400-page Telecom 101 textbook, 3<sup>rd</sup> edition, free!

## Detailed Course Description

*Telecom, Datacom and Networking for Non-Engineering Professionals* is our core training, organized into three modular parts: telecom, datacom and... networking. We'll start at the beginning of the story, progress through key concepts in a logical order, and finish at the end. Our goal is to bust the buzzwords, cut through the jargon and doubletalk to put in place a clear, structured understanding of telecom, datacom, IP and networking.

### Part 1: Fundamentals of Telecommunications

The first part covers the Public Switched Telephone Network, equipment and call centers, the telecom business, carriers, digital voice transmission, T1, fiber and SONET backbones, and wireless ... the groundwork for understanding everything.

<b>Objectives</b>	<b>What you will learn</b>
<ul style="list-style-type: none"> <li>• Understand telecom fundamentals:</li> <li>• Telephony and the telephone network</li> <li>• The telecom business</li> <li>• Digital transmission systems and services</li> <li>• Fundamentals of wireless.</li> <li>• Fill in the gaps in your knowledge.</li> <li>• Form a solid base on which to build.</li> </ul>	<ul style="list-style-type: none"> <li>• The structure and operation of the telephone network.</li> <li>• What analog means. The voiceband. Loops and trunks.</li> <li>• Plain Ordinary Telephone Service.</li> <li>• What CO switches, PBXs, IVRs, ACDs and modems do.</li> <li>• All about LECs, CLECs, IXCs and interconnections.</li> <li>• What digital means. What a DS0 is.</li> <li>• The difference between a DS1 and a T1.</li> <li>• DS3, T3, SONET, and ISDN. Time-Division Multiplexing.</li> <li>• What fiber is and how backbones are built with fiber.</li> <li>• Wireless and cellular concepts, terminology, standards.</li> </ul>

#### 1-1. Fundamentals of Telephony

Whether you're interested in telecom, datacom, wireless, Wide Area Networking or Voice over IP, everything begins with the Public Switched Telephone Network and Plain Ordinary Telephone Service. We'll begin with a model for the PSTN, explaining analog circuits and circuit switching, as well as common telephony buzzwords and jargon, and an overview of SS7.

- A. History of Telecommunications
- B. The Public Switched Telephone Network (PSTN)
- C. Analog Circuits
- D. What is Sound?
- E. The Voiceband
- F. Plain Ordinary Telephone Service (POTS)
- G. DTMF Address Signaling
- H. Signaling System 7 (SS7)

#### 1-2. Telecom Equipment

We'll round out our discussion of telephony with a practical overview of different types of equipment that can be connected to the telephone network. Without bogging down on details, we'll sort out switches, PBXs, ACDs, IVRs, Call Centers and modems, including a discussion of DSL and how it is provided.

- A. Telephone Switches
- B. PBXs vs. Centrex
- C. Call Centers: IVRs and ACDs
- D. Modems
- E. DSL Technologies: Beyond the Voiceband
- F. DSLAMs

### 1-3. The Telecommunications Industry

With a basic framework in place, we'll review the telecommunications business, including companies, alliances, services and competition, and understand how each organization fits into the picture, including the competitive environment, POPs, MANs, CLECs and collocation.

- A. Domestic Carriers and Players
- B. PSTN Switching Center Hierarchy
- C. 1984: LECs, POPs and IXCs - Switched Access to LD Competition
- D. Dedicated Access for LD Competition
- E. Collocation and CLECs
- F. Mature Competitive Carrier Network: Regional Rings, POPs and MANs

### 1-4. Digital Communications Concepts

With the fundamental structure in place, we'll understand how – and why – voice is digitized. We'll discuss what is really meant by “digital” and explain DS0s, channels, the 64 kb/s rate and the DS0-DS1-DS3 digital hierarchy. We'll provide a practical overview of digital services, including T1, T3, SONET and ISDN. At a high level, we'll explore the different types of traffic that can be carried over these circuits, and how voice, data and video can be integrated.

- A. Why Digital?
- B. Analog and Digital: What Do We Really Mean?
- C. Voice Digitization (Analog-Digital Conversion)
- D. The Digital Hierarchy: DS0-DS3
- E. Carrier Systems Overview: T1, T3, SONET, ISDN
- F. Digital Circuit Applications
- G. Integration: Voice, Video, Data

### 1-5. Transmission Systems

Time Division Multiplexing (TDM) and digital carrier systems are technologies at the heart of telecommunications networks. Without getting bogged down on technical details, we'll use T1 as an example to explain multiplexers and how TDM and channels are implemented and what repeaters do. With concepts in place, we'll cover fiber optics, SONET rings and Dense Wave-Division Multiplexing (DWDM): the backbone of networks.

- A. Channelized Time Division Multiplexing
- B. TDM Example: T1 Carrier System
- C. Multiplexers
- D. Framing and Channels
- E. Pulses and Repeaters
- F. How T1 is Actually Provided
- G. Fiber Optics and Fiber Cables
- H. SONET and DWDM: Core Networks
- I. International Digital Hierarchies

### 1-6. Wireless Communications

We'll round out your knowledge of telecom fundamentals with wireless. We'll cover jargon and buzzwords in the mobility business, the idea of cellular, and sort out different cellular technologies, including analog, PCS and 3G and understand CDMA vs. TDMA/GSM. We'll conclude with an overview of Wi-Fi and satellite communications.

- A. Wireless
- B. Mobile Networks and Cellular Concepts
- C. First Generation: AMPS
- D. Second Generation: PCS
- E. Digital Cellular: Voice Communications
- F. Digital Cellular: Data Communications - Air Cards, iPhone-type Internet
- G. CDMA vs. TDMA/GSM
- H. 3G: CDMA 1X vs. UMTS
- I. Next: 4G LTE
- J. Wireless LANs and Wi-Fi
- K. Satellite Communications

## Part 2: Understanding Data Communications

The second part covers datacom basics including the crucial concepts of IP packets and LAN frames; all about modems including DSL and cable modems, data over digital cellular, how digital circuits and services are provided, muxes vs. switches vs. routers, and finishes with LANs: building blocks for the Networking part.

### Objectives

- Understand datacom fundamentals
- The components of a circuit
- How data is organized for transmission
- How data is actually moved from A to B.
- Get the big-picture view.
- How carrier services are actually provided.
- Understand and compare different services.
- Understand LANs.

### What you will learn

- DTEs, DCEs, media, and how they form a circuit.
- Common configurations: LANs and WANs.
- An overview of binary and hex.
- Character coding: ASCII, unicode and UTF.
- Start / stop / parity.
- Frames and packets. Ethernet frames. IP packets.
- All about modems, modulation, concepts and standards.
- DSL vs. Cable: which is faster? Cable TV systems.
- Network equipment: switches vs. muxes vs. routers.
- LANs: Ethernet, MAC address, cable cats, switches.

### 2-1. Introduction to Datacom and Networking

We'll begin the second module by introducing a model for data circuits, reviewing each component in the model, and exploring practical examples of circuit and network configurations. With this framework in place, you'll be able to categorize and compare different types of equipment and circuit configurations.

- A. Data Circuit Model: DTEs and DCEs
- B. Analog and Digital Data Circuits
- C. Serial and Parallel
- D. Multidrop Circuits
- E. Local Area Networks (LANs)
- F. Wide Area Networks: Routers
- G. TCP/IP for Networking

### 2-2. How Data Is Formatted for Transmission

In this chapter, we'll put in place a solid understanding of the key concepts of IP packets and LAN frames, ensuring that you have a solid foundation on which to build an understanding of routers, bandwidth-on-demand services and the Internet.

- A. Formatting Data for Communication: Essential Functions
- B. Binary and Hexadecimal
- C. Character Coding: ASCII, ISO and Unicode UTF-8
- D. Start / Stop / Parity
- E. Frames
- F. Packets
- G. Packets and IP Addresses vs. Frames and MAC Addresses
- H. IP Packets

### 2-3. Modems: Voiceband, Radio, DSL and Cable

In this chapter, we'll learn how modems transmit 1s and 0s over analog circuits. We'll explain jargon like baud rate and half duplex, and you'll receive practical guidelines on current modem standards and what connection speeds to expect.

- A. Data over the Voiceband
- B. Representing Data in a Frequency Channel
- C. Modulation Techniques: ASK, FSK, PSK, QPSK, QAM
- D. Jargon and Buzzwords: Baud Rate, Half-Duplex
- E. DSL Technologies: Beyond the Voiceband
- F. Dial-up vs. DSL Connectivity
- G. VSDL Technologies and Speeds
- H. Cable TV Distribution Systems
- I. Cable Modems

## 2-4. Data Services and Network Equipment

In this chapter, we'll build on the basic discussion of digital from module 1 to show how digital circuits are used for data communication. We'll show you the three basic kinds of datacom services available, and the circuits and equipment used by carriers to actually provide these services... highly useful knowledge when evaluating, ordering or troubleshooting carrier services. We'll introduce the idea of statistical multiplexing and bandwidth-on-demand to prepare for the discussion of packet networks and services in Module 3.

- A. Digital Access and Transmission Technologies
- B. Anatomy of a Digital Circuit
- C. Common Carriers' Transmission Networks
- D. ... How Circuits are Actually Implemented by Carriers
- E. Network Equipment: How and Where Each Is Used
- F. ... Routers vs. muxes. vs. switches
- G. Channelized TDM
- H. Statistical TDM
- I. Summary: How Circuits are Actually Provided

## 2-5. Understanding LANs

LANs are the standard method of implementing circuits in-building. We'll complete this module with a basic, solid understanding of LANs: Ethernet and the original idea of a bus, how this changed to 100 Mb/s and now Gigabit Ethernet connected with LAN switches. You'll learn about categories of cables, hubs and switches. We'll conclude interconnecting LANs using routers and TCP/IP to form a WAN... leading in to Module 3.

- A. Bus Topology
- B. 802.3 and Ethernet
- C. Evolution of Ethernet
- D. Fast Ethernet and Gigabit Ethernet
- E. LAN Cables: Category 5, 5e and 6
- F. Repeaters and Bridges
- G. Ethernet Switches
- H. Interconnecting LANs with Routers

## Part 3: Understanding IP and Networking

The third part brings it all together with a structured discussion of networking: protocol stacks, routers, IP addresses, bandwidth-on-demand services, Voice over IP (VoIP) and IP VPNs, the Internet, and finishes with a top-down review and templates for mainstream solutions you can put to immediate use.

<b>Objectives</b>	<b>What you will learn</b>
<ul style="list-style-type: none"> <li>• Understand networking fundamentals as well as current practical technologies, services and solutions.</li> <li>• Understand protocol stacks and OSI, IP addressing and routers</li> <li>• Understand carrier packet network services</li> <li>• Gain an overview of Voice over IP and how VoIP connects to the PSTN.</li> <li>• Understand Internet structure and operation.</li> <li>• Learn technology deployment steps.</li> </ul>	<ul style="list-style-type: none"> <li>• Truly understand the OSI layers and protocol stacks.</li> <li>• Routers, IP address classes, DHCP, private addresses</li> <li>• NAT for sharing network connections</li> <li>• Private networks and dealing with carriers.</li> <li>• Bandwidth-on-demand and Virtual Circuit concepts.</li> <li>• How TCP and IP are used with Frame Relay.</li> <li>• MPLS as the replacement for Frame Relay.</li> <li>• The need for QoS. Implementing QoS with MPLS.</li> <li>• The components of a Voice over IP (VoIP) system.</li> <li>• How VoIP connects to the PSTN.</li> <li>• What an IP VPN is.</li> <li>• The history, structure and operation of the Internet.</li> <li>• Internet issues like ISPs, MIME, domain names.</li> <li>• Practical mainstream solutions for networks.</li> </ul>

### 3-1. Understanding Protocol Stacks

Standards and protocols play a key role in the understanding of networks, particularly how TCP, IP and LANs fit together. We'll begin the third module by exploring the Open Systems Interconnect 7-layer reference model. You'll learn what a layer is, the purpose of each layer, see examples of protocols used to implement each layer, and learn how a protocol stack really works.

- A. Protocols and Standards
- B. Open Systems vs. Proprietary Solutions
- C. Protocol Stacks: The ISO OSI 7-Layer Reference Model
- D. Understanding the Layers
- E. Understanding How a Protocol Stack Works
- F. Key Standards Organizations

### 3-2. IP Addressing, Routers and Private Networks

With a structure in place for discussing what we need to do, we'll look at popular mainstream solutions for *how* networks are implemented. The first stop is private networks, composed of dedicated lines connected with routers, allowing us to understand the functions routers perform and cover what you need to know about IP: IP addressing, dynamic addresses and DHCP, private addresses and NATs. You'll learn how multiple computers can share a single Internet connection. We'll complete the chapter with practical guidelines on how to order and manage dedicated lines and deal with carriers.

- A. Review: Integrating Applications on High-Speed Circuits
- B. Efficient Use of Voice Channels for Bursty Data
- C. Case Study: Dedicated-Line WAN – Integrated Data, Voice, Video
- D. Edge Routers as a Point of Control
- E. IP Address Classes
- F. Dynamic IP Addresses and DHCP
- G. Private IP Addresses
- H. Network Address Translation
  - ... Connect Multiple Computers to a Single Internet Connection
- I. Case Study: Private Network Using LANs, T1, Routers and TCP/IP
- J. Practical Issues
  - ... Dealing With Carriers - Ordering Circuits
  - ... Circuit Troubleshooting Basics; BERT
  - ... In-Service Monitoring and ESF

### 3-3. Bandwidth-On-Demand: Packet Network Services

Bandwidth on demand or "packet-switched" services have strong cost and flexibility advantages over dedicated lines. We'll understand packet network concepts, how and why Virtual Circuits are implemented, and what the jargon and buzzwords really mean. You will understand the widely-used TCP/IP over Frame Relay and discuss performance issues... which leads into understanding the need for Quality of Service (QoS) guarantees, ATM and MPLS.

- A. Bandwidth on Demand Service Concepts
- B. Virtual Circuit Technologies
- C. X.25 and Jargon
- D. Frame Relay
- E. TCP/IP over Frame Relay to implement a WAN
- F. Frame Relay Performance: CIR and BIR
- G. QoS Requirements for Voice over IP
- H. ATM
- I. MPLS
- J. TCP/IP over MPLS

### 3-4. IP Network Services: Voice over IP (VoIP) and IP VPNs

In this chapter, we focus on two primary services that can run on an IP/MPLS network: voice and secure data communications. We'll begin with an introduction to Voice over IP components, jargon and buzzwords, and understand how VoIP will mesh with the PSTN covered in Module 1. You'll also understand how IPsec protocols and equipment implement IP VPNs for secure business data communications over IP networks.

- A. Voice over IP
- B. Net to Phone: Reseller-Type VSPs (DS0 Interconnect to LEC)
- C. Internet Telephony from LEC / CATV
- D. Managed-IP Telephone Service (MIPT)
- E. Customer-Premise-Based VPN
- F. Carrier VPNs: Network-based IPsec with QoS

### 3-5. Understanding the Internet

Let's not forget the Internet! In this chapter, we'll review the Internet's past and present, understand what an ISP does, and gain a real understanding of TCP and IP. We'll review HTML, HTTP, secure web pages, Web servers and browsers, and details like the Domain Name System, MIME and Base-64 encoding. We'll complete the picture with a review of connection methods and current Internet issues including IPv6.

- A. Internet History
- B. Internet Fundamentals: connectionless, unreliable service; routing tables
- C. TCP and UDP
- D. Internet Service Providers (ISPs)
- E. Commonly Used Internet Protocols
- F. Domain Name System
- G. MIME and Base-64 encoding
- H. The World Wide Web, HTML, HTTP and SSL
- I. Current Internet Issues

### 3-6. Wrapping Up

The final chapter brings all of the concepts together with a top-down review. You'll learn valuable insight in how technology *should* be deployed, and review mainstream services and solutions. We'll conclude with a view toward the future: the IP Packet-Switched Telecommunications Network... the first slide from course 401.

- A. Technology Deployment Steps
- B. Requirements Checklist
- C. High-Level Design
- D. Review: Circuits and Services
- E. Access Circuit / Network Service Cross-Reference Matrix
- F. Private Network
- G. Frame Relay
- H. Native IP Services
- I. The IP-PSTN

A number of appendices are included in the course book as additional reference material:

#### **Appendix A: History of Canadian Telecommunications**

#### **Appendix B: Voice Services and Jargon**

Older jargon and buzzwords like tie lines, foreign exchange circuits and WATS used in voice communication services.

#### **Appendix C: More About T1**

Fractional T1 and cross-connects, bit-robbing and 56 kb/s, B8ZS and 64 kb/s clear channels.

#### **Appendix D: Start Bits, Stop Bits, Parity Checking**

#### **Appendix F: Modulation Techniques**

Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Voiceband Standards

#### **Appendix E: Acronyms and Abbreviations**

## Training on DVD/Video

Teracom's self-paced DVD-video courses: ideal for those who need to learn about telecom, datacom, networking, IP, wireless and VoIP outside of structured seminars. Our current library includes:

- V1 **Fundamentals of Telecom 1:** The PSTN • Telephony • Telecom Equipment • The Telecom Industry
- V2 **Fundamentals of Telecom 2:** Digital Voice • DS0-DS3 • TDM • T1 • T3 • ISDN • SONET • Fiber • DWDM
- V3 **Fundamentals of Datacom and Networking:** WANs and LANs • MAC Frames, IP Packets • Network "Cloud"
- V4 **Understanding Networking 1:** OSI Layers • Protocol Stacks • The FedEx Analogy • IP Addressing, DHCP, NAT • Bandwidth on Demand Services • Frame Relay • ATM • MPLS
- V5 **Understanding Networking 2:** Internet • ISPs • Security • Viruses • Firewalls • Encryption • IPsec • VPNs
- V6 **Understanding Wireless 1:** Wireless Fundamentals • Cellular: CDMA, TDMA, GSM, GPRS • 3G: UMTS, CDMA2000, 1X, 1XEV-DO • Wireless Web
- V8 **Understanding Voice over IP 1:** Components • Standards • Architectures
- V9 **Understanding Voice over IP 2:** Voice Packetization • Quality • Codecs, Jitter, Packet Loss • Diff-Serv • Network QoS with MPLS
- V10 **Understanding Voice over IP 3:** SIP and IP Call Flow • Carrier Interconnect • Megaco

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## 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's and Master of Engineering (Electrical) degrees, and is licensed as a Professional Engineer in his home jurisdiction.

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 network equipment design; on satellite radar systems; Wide Area Network design for HMO applications; and many other projects in capacities ranging from detailed design and implementation to systems engineering, project leader and consultant.