Teracom Training Institute
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Best of breed: telecom training – since 1992

CTA-2026

Certified Telecommunications Analyst (CTA)

An intensive course for non-engineering professionals covering all major topics… in plain English.

CTA is designed for non-engineers who need a comprehensive overview and update on telecommunications, and for newcomers who need to get up to speed quickly. CTA-2026 is an intensive sixteen-module course delivering a solid foundation of knowledge covering virtually all aspects of broadband, telecom, datacom and networking, from fundamentals and jargon to the latest technologies – plus TCO CTA-2026 Certification to prove it.

We'll bust the buzzwords, explain the jargon, and more importantly, the *ideas* behind the jargon: key concept-level knowledge that you can't get on the job, from webpages, chatbots or listening to vendors. Covering the topics in a systematic way, we build structured knowledge that lasts a lifetime.

Tuned and refined over more than twenty years, and constantly updated, this course delivers the core knowledge necessary for anyone serious in telecom today.

People from organizations including DoJ, DEA, NNSA, Cisco, Intel and Microsoft, CIA, NSA, IRS, FAA and FBI, US Army, Navy, Air Force, Marines, Coast Guard and Space Force, AT&T, Verizon, Bell Canada, Wells Fargo, Bank of America, TD Bank, Oneida Tableware, the San Francisco Giants and hundreds of others who needed to be more effective in understanding and dealing with telecom and networking technology have benefited.

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. Join us today!

Course Objectives

- Establish a solid base in the fundamentals of today's telecom, datacom and networking.
- Fill in the gaps. Understand jargon and buzzwords.
- Understand mainstream technologies and solutions.
- Put a structure in place that project-specific knowledge can be built on in the future.
- Understand how it all fits together.
- Develop career-enhancing knowledge skills.
- Get TCO CTA-2026 Certification to prove it.

Prerequisites

None

Who should attend

- This course is for those needing to fill in the gaps, understand buzzwords, jargon and technologies like SIP, 5G, Ethernet, fiber, MPLS and TCP/IP, and more importantly, the ideas behind these technologies… and how it all fits together.
- Ideal for non-engineering professionals in need of a solid knowledge base to be effective in telecom projects and dealing with technical personnel.

Tuition Fees

Four-day instructor-led public CTA-2026 courses are value priced at $1595 live online or $1995 in-person, with the CTA exam and CTA certification in class.

Compare to $3250+ for lower quality elsewhere!

Self-paced online CTA-2026 Certification Package is under development, slated for release in 2026.

Course Content

Part 1: The Fundamentals

- Today's broadband converged IP telecom network
- Telecom fundamentals: pulses, modems, multiplexing
- Network fundamentals: IP packets and MAC frames
- The Internet, ISPs, Cloud Computing, Data Centers
- Encryption, Digital Certificates, IP VPNs, SD-WANs
- Digital Media: digital voice, video, images, data, text
- Fundamentals of Voice over IP and SIP

Part 2: Telecom Technologies

- Wireless: Cellular, 4G, 5G, Wi-Fi, Satellite,
- Fiber: fundamentals, WDM, Optical Ethernet, PONs
- Copper: POTS, DSL, Cable Modems, T1, LAN cables

Part 3: The Telecom Network

- Carrier Connections and The Telecom Industry
- The OSI Layers and Protocol Stacks
- Ethernet LANs, LAN switches and VLANs
- Routers, IP addresses, DHCP, public-private NAT
- IPv6 address types and allocation
- Carrier networks, SLAs, Class of Service
- MPLS for CoS, VPNs, integration and aggregation
- Security Risks and Measures

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

Course Modules

Instructor-led CTA-2026 and self-paced online CTA-2026 are both composed of sixteen comprehensive modules. Each module has an associated exam of ten multiple-choice questions. Writing and passing the exams results in TCO CTA-2026 certification.

Part 1: Fundamentals

1. Introduction to Broadband Converged IP Telecommunications
2. Telecom Fundamentals
3. Network Fundamentals
4. The Internet, Cloud Computing and Data Centers
5. Encryption: Certificates, VPNs, SD-WANs and the Dark Web
6. Digital Media: Voice, Video, Images, Quantities, Text
7. Fundamentals of Voice over IP

Part 2: Technologies

8. Wireless
9. Fiber Optics
10. Copper

Part 3: The Telecom Network

11. Carrier Connections and The Telecom Industry
12. The OSI Layers and Protocol Stacks
13. Ethernet, LANs and VLANs
14. IP Networks, Routers and Addresses
15. MPLS and Carrier Networks
16. Security Risks and Measures

Detailed description of modules and lessons starts on page 7.

Course Schedule and Registration

CTA-2026 is currently offered only as instructor-led training. Space in our seminars is limited, and may sell out, so please register as early as possible to reserve your place.

To see the latest schedule and register online, please visit teracomtraining.com, or call us at 877-412-2700. We can also come to you for a private seminar.

The self-paced online CTA-2026 Certification Package is currently in development, slated for release in 2026.

Course Philosophy and Goal

Our philosophy is: start at the beginning. Understand the fundamental ideas. Understand mainstream technologies that implement these ideas. Learn the acronyms, abbreviations and jargon. Get an unbiased big-picture view that will give you the knowledge you need to ask the right questions, make meaningful comparisons and informed decisions.

Our goal is to eliminate frustration, increase confidence, accuracy and productivity by building a solid vendor-independent knowledge base that has both immediate and long-term value, with a TCO Certification to prove it.

Demystify Buzzwords and Jargon

One of the biggest challenges in telecommunications is dealing with all of the acronyms, abbreviations, jargon and buzzwords.

The list goes on and on: Broadband, Ethernet, TCP/IP, SIP trunking, OSI, Layer 2 switch, VoIP, Hosted PBX, DSL, OE, PRI, ILEC, POP, MAN, Wi-Fi, LAN, WAN …

It can be very frustrating sitting in meetings with these terms flying around and not understanding most of them… particularly when someone asks your opinion.

Plus, there is a second-order problem: even if you were to figure out all of the current jargon and buzzwords, there will surely be more next month!

The solution? Understand the fundamentals. Take the cover off the box and see what it does and how it works. Doing this, you'll find out there are only four or five fundamental ideas in telecom, with ongoing incremental improvement in each area.

Once you understand the fundamentals, not only will the buzzwords and jargon be demystified, you'll have a solid knowledge base. In the future, if you're not familiar with the exact product someone is discussing, you'll still know what they are talking about.

Part 1: Fundamentals

We'll begin with a big-picture view, identifying the different parts of the network, understanding how circuits are implemented by carriers, how carriers interconnect, and the residential, business and wholesale services.

We'll make sure everyone is starting at the same level, with telecom essentials like how bits are represented using pulses on fiber and LAN cables, how bits are represented using modems on wireless and coax systems, and the different kinds of multiplexing.

Without bogging down on details, you'll learn the mechanics of the broadband converged telecom network: IP packets carried in MAC frames, and how phone calls, television, images and text are digitized and carried in the IP packets.

Internet cloud computing and data centers are a mammoth business and one of the biggest growth areas in the telecom area today. We'll start by reviewing what the Internet actually is, and the role of ISPs. Then we'll understand the web: client-server computing over the Internet, and how back-end processing is needed to answer the chat question or generate the Google map image… and how the computing power necessary to support millions of users doing this is implemented in data centers with cloud computing.

Encryption is a critical element of many telecom technologies. We'll cover the basics of public and private key encryption, and understand how it's used to implement digital signatures and certificates, VPNs, SD-WANs and the Dark Web.

To complete the fundamentals, we'll understand how Voice is carried in IP packets, with calls set up using the SIP protocol, and how softswitches, call managers and gateways fit into the story.

Part 2: Technologies: Wireless, Fiber and Copper

With the fundamentals in place, we'll understand the technologies for communicating over radio, fiber and copper wires, and the mainstream technologies in each area.

In the wireless module, we'll start with spectrum, then you'll learn the components and operation of a mobile cellular network, 4G LTE and 5G, mobile internet, fixed wireless broadband internet, Wi-Fi and satellites.

In the fiber module, we'll understand the basic principles of fiber and fiber cables, wavelengths, Optical Ethernet and PONs. For copper, you'll learn how DSL and Cable modems work, along with LAN cable categories and more.

You'll learn the kinds of equipment used, what each does, and how it all interconnects for phone calls and Internet traffic.

Taking this course to understand the fundamental ideas and mainstream technologies puts you in control, with the confidence to contribute effectively.

Part 3: The Network – and Security

In the not-too-distant future, the Internet and the Public Telephone Network will become the same thing, and all communications including phone calls, television and internet traffic will be in IP packets carried on Ethernet.

A good understanding of Ethernet, LAN switches, VLANs, IP addresses, IP packets and what routers do is a cornerstone of modern telecommunications knowledge.

Taking this course, you'll fill the gaps in your knowledge of IP and packet networks, and fully understand the ideas of packets, IP addresses and routers. We'll demystify DHCP, static and dynamic addresses, private and public addresses and Network Address Translation. You'll also learn how everyone gets 18 billion billion IPv6 addresses.

We'll complete your knowledge with MPLS, understanding how MPLS is used as an IP packet traffic management system, to implement Class of Service quality guarantees, and to implement business communication services called MPLS VPNs.

With the good comes the bad, so we'll complete the course with a survey of security topics including attacks and attackers, network security, firewalls, viruses, Trojans, spyware, exploits and zero-day exploits.

Gain Vendor-Independent Knowledge You Can Build On

The knowledge you gain taking this renowned training is vendor-independent foundational knowledge in telecommunications, networks, IP, packets, fiber, wireless: fundamentals, technologies, standard practices, and how it all fits together.

You will be able to build on this proven knowledge base to quickly get up to speed for a particular project - then have the versatility to work on subsequent projects.

Not only will it eliminate buzzword frustration, the cost of this training will be repaid in improved accuracy and productivity gain many times over.

Register today to get this career-enhancing addition to your knowledge skills!

Your Course Materials: An Invaluable Reference

No-one expects anyone to learn all of this in one shot! For self-study and day-to-day reference, every CTA-2026 Instructor-Led Training course comes with a high-quality printed color course workbook that's been called the best on-the-job reference tool around.

Written in plain English, this easy-to-use course workbook includes copies of all graphics plus detailed text notes.

Topics are organized in logical groups to give you easy reference to the practical experience, theoretical background, and unbiased information on industry technologies, products and trends you will need.

With numerous modules covering all major topics, you'll obtain an invaluable resource impossible to find anywhere else in one book.

The self-paced online CTA-2026 Certification Package (slated for release in 2026) includes online lessons with unlimited repeats. The CTA-2026 Study Guide is available as an optional supplement in hardcover, softcover and eBook. This companion Study Guide will enhance learning and retention, and serve as a valuable reference book after.

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

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. Totally up to date for the 2020s!

1. Cut through the jargon and vendor hype to gain a structured understanding of telecommunications and networking, allowing you to make informed choices and meaningful comparisons -- knowledge you can't get on the job, reading trade magazines or talking to vendors, and an investment that will be repaid many times over.
2. Eliminate buzzword frustration, be more confident, more accurate and more productive.
3. Get up to speed on the latest developments and trends. This course is totally up to date with SIP trunking, VoIP, 5G, Optical Ethernet, MPLS, Data Centers, Cloud Computing and more.
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. Get TCO CTA-2026 Certification, along with a personalized Letter of Introduction explaining the content covered by your certification.
6. Get a high-quality color course book with copies of graphics plus detailed text notes, bringing together all of this information, impossible to find in one place anywhere else, sure to be a valuable reference for years.

Here's What Seminar Attendees Like You Are Saying

Hundreds of people like you have benefited from Teracom's core 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

"Thank you for conducting a very successful course last week. It was both informative and interesting and you were able to find the perfect balance of sharing deep knowledge, provide relatable examples and lighten it up with great humor. The feedback that we have received has been extremely positive."
- Charlotte Kaheru, International Finance Corporation, World Bank

"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", 5G, MPLS, VPN, Data Center, Cloud Computing…

"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, AT&T

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

"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

"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

Detailed Course Outline

Part 1: Fundamentals

The first part is seven modules that cover the fundamentals of telecom, filling gaps, explaining concepts and establishing a solid knowledge base. First is a high-level pass with a big-picture view and introducing all of the course topics. Then we progress in a logical order: how telecom circuits are provisioned by carriers, telecom fundamentals, followed by IP packet network fundamentals. Then you'll learn about the Internet as a business: ISPs, web services like AWS, cloud computing and data centers. We'll understand public key and private key encryption, and how they are used to implement virtual private networks and SD-WAN, and the Dark Web. The fundamentals also include digital media: how voice is digitized, digital video, digital images, digital quantities and digital text. We conclude with the fundamentals of Voice over IP and SIP.

1. Introduction to Broadband Converged IP Telecommunications

We begin with a comprehensive big-picture introduction to broadband telecom: the concepts of convergence and broadband, today's telecom network, the parts of the network, the three key technologies: Ethernet, IP and MPLS, what they are and what each does. You'll learn how a circuit is implemented end-to-end, and identify today's standard residential, business and wholesale services.

A. Introduction
B. Convergence
C. Broadband
D. Today's Broadband Converged IP Telecommunications
E. The Network Core
F. Network Protocols: Ethernet, IP and MPLS
G. Network Access: The Last Mile
H. Anatomy of a Service
I. Inside the Network Cloud
J. Network Equipment: Routers, Switches and Multiplexers
K. Carrier Interconnect: Internet and Phone Calls
L. Residential, Business and Wholesale Services

2. Telecom Fundamentals

Next, we'll ensure you have a solid foundation in the fundamental ideas of telecom: the elements of a circuit; terminals, clients, servers and peers; how bits are represented on fiber with pulses; and how bits are represented with modems on wireless, cable TV and DSL. Then we'll understand how capacity is shared to carry many users' traffic on common facilities: Frequency Division Multiplexing, Time Division Multiplexing, overbooking and Bandwidth on Demand.

A. Communication Circuit Model
B. Terminals, Clients, Servers and Peers
C. Analog vs. Digital Pulses
D. Modems and Modulation: Bits in Frequency Channels
E. Frequency-Division Multiplexing: Coax and Fiber
F. Time-Division Multiplexing (TDM)
G. Statistical TDM: Overbooking and Bandwidth on Demand

3. Network Fundamentals

In this module, we'll ensure you also have a solid foundation in the fundamentals and jargon of the network. Today's converged telecom network is based on what used to be called "data communications": packets in frames. Without bogging down on details, we'll review basic circuit configurations, understand how routers relay packets from one circuit to another, and how the packets are actually transmitted from one device to another in frames. You'll fill gaps and get up to speed on IP packets, MAC frames and MPLS labels, what each is for and how they work together.

A. Point-to-Point Circuits: Serial and Parallel
B. Multidrop Circuits: Point to Multipoint
C. LANs and Broadcast Domains
D. Framing and Error Control
E. Frames & MAC Addresses
F. Networks, Routers and IP Addresses
G. Carrier Packet Network Services
H. IP Packets vs. MAC Frames
I. IP Address vs. MAC Address: SFO - NYC via AT&T
J. IP Packets
K. TCP, UDP and Port Numbers
L. MPLS Labels

4. The Internet, Cloud Computing and Data Centers

The Internet, which started out as a way to send text email messages, is now worldwide converged broadband communications. In this module, we'll understand what exactly an Internet Service Provider does, and how they get packets delivered world-wide. We'll review web clients, browsers and apps, web servers, then understand the huge business of web services, cloud computing and data centers.

A. A Network to Survive Nuclear War
B. The Inter-Net Protocol
C. Internet Service Providers (ISPs)
D. Domain Name System (DNS)
E. Web Clients: Browsers and Apps
F. Web Servers: HTTP, HTTPS, HTML
G. Web Services and Cloud Computing
H. Data Centers

5. Encryption: Certificates, VPNs, SD-WANs and the Dark Web

Encryption plays a key role in many of today's telecom and network technologies and services. We'll begin by understanding symmetric key encryption vs. asymmetric key encryption, public key encryption (PKI) and private key encryption. Then we'll explore implementations, including digital certificates for secure web browsing, digital signatures for authentication, IP VPNs and SD-WANs for secure point-to-point Internet communications, country-spoofing VPNs, and basics of anonymizer VPNs and the Dark Web.

A. Public Key and Private Key Encryption
B. Digital Certificates, SSL and TLS
C. Digital Signatures
D. IP VPNs
E. SD-WANs
F. Country-Spoofing VPN Service
G. Anonymizer VPN Service: Tor Virtual Circuits
H. The Dark Web

6. Digital Media: Voice, Video, Images, Quantities, Text

The converged network carries all media: voice, video, text and images in packets. An essential first step is digitizing the media, representing it using 1s and 0s, to be carried in said packets. We'll understand how voice is digitized and reconstructed, and the G.711 64 kb/s standard. The same principles apply to images and video in formats like jpg and mp4 video. We'll review binary and hexadecimal, and finish with unicode for text and emojis.

A. Analog and Digital: What Do We Really Mean?
B. Continuous Signals, Discrete Signals
C. Voice Digitization (Analog → Digital Conversion)
D. Voice Reconstruction (Digital → Analog Conversion)
E. Digital Voice: 64kb/s G.711 Standard
F. Digital Video: H.264 / MP4, HD, 4K
G. Digital Images: JPG, GIF, PNG
H. Digital Images in Emails: MIME
I. Digital Quantities: Binary and Hex
J. Digital Text: ASCII and Unicode

7. Fundamentals of Voice over IP

In this module, you'll learn the fundamental ideas and behind VoIP, SIP and all the other jargon. We'll explain VoIP phone system components and operation, and how voice communications in packets works end-to-end, microphone to speaker. We'll sort out SIP, softswitches / call managers, SIP Trunking, VoIP on LANs and WANs, VoIP phones, Softswitch as a Service (SaaS) in the Cloud, along with a peek at The Future.

A. The Big Picture
B. Business VoIP Phones
C. Voice in IP Packets
D. Soft Switches / SIP Servers / Call Managers
E. Media Servers: Video Servers
F. Gateways
G. Voice over IP over LANs and WANs
H. Key VoIP Standards
I. Where All of This is Headed: Broadband IP Dial Tone

Part 2: Telecom Technologies

In the second part of the course, we explore the three main technologies for transmitting information from one place to another, grouped into wireless, fiber and copper. We'll cover wireless spectrum, mobile network components and operation, 4G LTE, 5G, fixed wireless broadband home internet, Wi-Fi and satellites. Then you'll learn optical basics, and how networks are built with point-to-point fibers running Optical Ethernet, wave-division multiplexing, fiber in the core, metro and to the premise. We'll finish with copper-wire technologies: DSL and POTS on twisted pair, Hybrid Fiber-Coax cable TV systems, T1 and the categories of LAN cables.

8. Wireless

In this module, you will learn all about wireless transmission. We'll identify the components and basic principles of operation of a mobile network. You'll understand the requirements for coverage, capacity and mobility, and why cellular radio systems are used. You'll learn how mobile to PSTN phone calls are connected, how mobile Internet works, roaming and virtual operators. You'll learn about 4G LTE and 5G for mobile, and fixed wireless broadband internet. We'll cover Wi-Fi and the latest standards, and finish with satellite communications.

A. Radio Fundamentals
B. Spectrum
C. Mobile Network Components and Operation
    1. Towers
    2. Transceivers
    3. Backhaul
    4. Mobile Switches & MTSOs
D. Cellular and Handoffs
E. PSTN Phone Calls using the Phone App ("Voice Minutes")
F. Mobile Internet ("Data Plan")
G. Mobile Operators, MVNOs and Roaming
H. Spectrum-Sharing Technologies: FDMA, TDMA, CDMA, OFDMA
I. 4G LTE
J. 5G New Radio (NR) and New Bands
K. Wi-Fi: Wireless LANs & 802.11 Standards
L. Wi-Fi Security and WPA3
M. LEO and GEO Satellites

9. Fiber Optics

The core of the converged network is routers connected point-to-point to other routers with fiber. Telephone companies that used to pull copper access wires to every home in a suburb are investing to pull an access fiber to every home. In this module, we'll cover the basics of fiber, the makeup of fiber cables, wavelengths and WDM. You'll understand how Optical Ethernet is used to actually implement the fiber connections, and how OE is used in the core, in metro areas, and fiber to the premise via Passive Optical Networks (PONs).

A. Fiber Basics
B. Fiber Optics and Fiber Cables
C. Optical Wavelengths, Bands and Modes
D. Wave-Division Multiplexing: CWDM and DWDM
E. Optical Ethernet
F. Core Network Nodes
G. Metropolitan Area Networks
H. Fiber to the Premise: PONs and Optical Ethernet

10. Copper

Before wireless and fiber, two copper wires were used as the physical access circuit for telephone and cable TV service in suburbs and cities. Today, these wires are used to deliver broadband. In this module, we'll understand how DSL broadband service runs on twisted pairs put in place for analog POTS telephone service; how cable modems move broadband on coaxial cable; and how both are delivered as fiber to the neighborhood then copper to the premise. To finish up, we'll review digital on copper wires: LAN cables and T1s.

A. The Public Switched Telephone Network (PSTN)
B. Legacy Channelized CO Circuit Switches, PBXs and Remotes
C. Analog Circuits
D. The Voiceband
E. Plain Ordinary Telephone Service (POTS)
F. DTMF Address Signaling
G. DSL: Beyond the Voiceband
H. DSLAMs
I. Fiber to the Neighborhood (FTTN), DSL to the Premise
J. VDSL2 Bands and Profiles
K. Hybrid Fiber-Cable Carriers: FTTN & Coax to the Premise
L. DOCSIS and Cable Modem Standards
M. T1 and E1
N. LAN Cables and Categories

Part 3: The Telecom Network

In the third part of the course, we understand the telecom network and the telecom business.

We begin with how and where connections physically take place for phone calls, for Internet traffic and CLEC services, who operates the facilities, and where the money is.

The next four modules are devoted to the nuts and bolts of the converged broadband IP telecom network: Ethernet, IP, and MPLS, starting with the OSI Reference Model and its layers to provide a structure for the discussion.

The final module completes the course with a survey of communication, information and network security topics, all necessary parts of telecommunications and the telecom network.

11. Carrier Connections and The Telecom Industry

To allow communications between customers of different carriers, the carriers must implement physical connections between their networks. In this module, we'll review how the Internet is actually implemented with peering and transit agreements at Internet Exchanges. You will also learn about toll centers and POPs: how and where local exchange service providers connect together and to other carriers for phone calls with a PSTN phone number; and SS7 to set up the calls. We'll finish by reviewing VoIP connections, and understanding where a CLEC fits into the picture with equipment collocated in wire centers.

A. IX: Interconnect for Internet Traffic
B. Wireline Long-Distance Competition: LECs and IXCs
C. Switched Access and POPs
D. Wireless and CATV Local Exchange Carriers
E. Inter-Carrier Call Setup: SS7
F. VoIP at Carriers and Session Border Controllers
G. SIP Trunking
H. PSTN VoIP Interconnection at the Toll Center
I. COs and Wire Centers
J. CLEC: Local Competition – Dark Fiber and Collocation

12. 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. We'll begin the fourth part of the course with the most commonly-used structure, 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 gain a true understanding of how a protocol stack works for applications like web surfing and VoIP.

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 Stacks
L. Protocol Stack in Operation: Babushka Dolls
M. Standards Organizations

13. Ethernet, LANs and VLANs

Ethernet is used in all parts of the network for point-to-point links between devices, implementing Layers 1 and 2 of the OSI model together. In this module, we'll review the basic principles of Ethernet and LANs, how it was formalized in the 802 series of standards, the concepts of MAC addresses, MAC frames and broadcast domains. You'll understand how LAN switches, also called Layer 2 switches, connect devices, and how VLANs separate devices as a basic network security function.

A. MAC Addresses, MAC Frames and Broadcast Domains
B. Ethernet and 802 Standards
C. LAN Switches, a.k.a. Layer 2 Switches
D. VLANs

14. IP Networks, Routers and Addresses

This module is devoted to IP, used to implement the network layer, Layer 3. We begin with IP addressing: IPv4 address classes, subnets, DHCP, static and dynamic addresses, public addresses, private addresses and NAT. We use the simplest IP network to explore how routers implement the network by relaying packets from link to link, and also act as a point of control to deny communications based on IP address and/or port number. We'll complete the module with IPv6 addressing.

A. IPv4 Address Classes
B. Subnets and Masks
C. DHCP, Static and Dynamic Addresses
D. Assigning Subnets to Broadcast Domains
E. IP Network: Routers Connected with Dedicated Lines
F. Routers and Customer Edge
G. Public and Private IPv4 Addresses
H. Network Address Translation
I. Carrier-Grade NAT
J. IPv6
K. IPv6 Address Allocation and Address Types

15. MPLS and Carrier Networks

IP packets will be used to carry everything, including phone calls and television. But IP in itself does not include any way to prioritize or manage traffic to guarantee call quality or picture quality. In the core of a carrier's network, MPLS is used to implement those functions. In this module, you'll learn the basics of carrier networks and the important concept of a Service Level Agreement. Then you'll gain a practical understanding of how MPLS works and how it is used by carriers to implement VPNs, different Classes of Service, service integration and traffic aggregation.

A. Carrier Packet Network Basics
B. Service Level Agreements and Class of Service (CoS)
C. Provider Equipment at the Customer Premise
D. Virtual Circuit Technologies
E. MPLS
F. MPLS VPNs for Business Customers
G. MPLS and Diff-Serv to Support Classes of Service
H. MPLS for Service Integration
I. MPLS for Traffic Aggregation

16. Security Risks and Measures

We complete the course with an overview of communication, information and network security. We'll begin with an overview of security areas and targets. We'll cover phishing and extortion, and what is actually done with data from "breaches". Next, we'll explore the risks and measures taken and best practices in network security, firewalls and ports, viruses, trojans and exploits.

A. Security Areas, Risks and Policy
B. Attacker Objectives
C. Phishing
D. Using Stolen Usernames and Passwords
E. Social Engineering
F. Authentication and Passwords
G. Network Security: Segmentation and Perimeters
H. Packet Forwarding vs. Packet Filtering
I. Port Filtering
J. Firewalls & Firewall Proxies
K. Stateful Packet Inspection Firewalls
L. Viruses
M. Trojan Horses and Spyware
N. Exploits, Zero-Day Exploits & National Vulnerability Database

Who Should Attend

- Professionals needing to fill knowledge gaps, understand buzzwords, jargon, and technologies like LTE, 5G, Ethernet, TCP/IP and MPLS, and more importantly, the ideas behind these technologies… and how it all fits together.
- Non-engineers in need of a solid knowledge base to be more effective in dealing with technology projects and technical personnel.
- Decision-makers and project managers who need to understand what the "techies" are saying.
- Managers and planners. Telecom and network system administrators. Finance, tax and accounting personnel. Software and support system developers.
- Anyone who wants to eliminate buzzword frustration to be more confident and more productive.
- Anyone willing to invest three days in career-enhancing training, the best you can get, with real instructor in a classroom setting, where you can interact and ask questions, with TCO Certifications and printed color reference books.

Bring This Course to Your Location

Since 1992, we have provided high-quality on-site training in telecommunications for non-engineering professionals at AT&T, Verizon, Bell Canada, TELUS, Qualcomm, 3Com, Cisco, Intel, Alcatel, Nortel, Teleglobe, the NSA, Defense Information Systems Agency, US Army, US Air Force, Office of Naval Intelligence, MindSpring, APEX Telecom, Equifax, Transamerica Insurance, The Hartford, American Broadband, Cap Gemini, ComSec Establishment, MicroCell Telecom, TDS Telecom, Kyocera, Winstar, Western Wireless, US Cellular, Ericsson/Hewlett-Packard, Entergy, Intelsat, RangeTel, Alltel, Vertek, DSCI, Cox Cable, Florida Power and Light, Frontier Communications, Western Iowa Telephone, Genuity, LG Electronics, Panasonic, SouthEast Telephone, State of Nebraska, State of Montana, Tektronix, 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 from fundamentals to the latest technologies... customizable 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 and government as a Subject Matter Expert in telecommunications, networking and metadata.

