Elearning Catalog

Telecom Training

NgnGuru Solutions
Taking Communication Beyond Horizon

TELECOMMENTOR

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Need For Telecommunication Training

In today's global economy and highly competitive market environment and at a time when growth and profit, extended coverage, the need to lower costs, and product innovation are increasing. TelecomMentor along with NgnGuru Solutions is providing training courses in the area of cutting edge next generation wireless & network technologies. Our portfolio of courses are developed utilizing the latest learning and delivery techniques that offer unrivaled development opportunities. Courses and training programs have been designed to meet the needs of individuals and corporation seeking a broad understanding of a range of modern wireless communications systems, networks and programming. Our products and services provide our clients with innovative, flexible, and cost-effective solutions that help rapidly boost their workforce productivity and competence to more quickly meet their market demands. The level of technical depth in our training courses gives students a unique benefit that they can apply immediately. We offer a range of courses appropriate for audiences needing a high-level overview

Our Approach to Training Delivery

TelecomMentor realizes on-site training is not always feasible for our clients. That's why we also offer the option of Web-based training. Clients save on expenses since there are no instructor and student travel-related costs. Also, the audience can be geographically distributed. As a result, productivity and learning are both maximized.

The Web-based format refers to delivering live Instructor Led training courses over the Internet using multimedia tools. TelecomMentor' Web-based environment adds a new dimension of learning and a different level of interactivity that creates an effective solution to meet your training needs.

Designed to accommodate a wide variety of learning styles, our eLearning courses take full advantage of the multimedia medium. Each course provides students with full audio, narrated text and colorful animations to enhance the learning experience. Review questions in a variety of formats test the students' understanding throughout each topic. Many courses also offer an opportunity to "dig deeper" into topics. Also, every eLearning course allows students to navigate through the courses according to their own interests and needs, rather than in a strictly "linear" fashion.

Organization Training Benefits

TelecomMentor' eLearning courses are rich in technical content. Courses are written by the same industry experts who create the Instructor Led course material. Courses are designed specifically for the self-paced multimedia learning environment and are not just a translation of our Instructor Led course material.

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Our Training Courses

Listed below are key learning courses offered at this time.

Generic Telecommunication

General Industry Knowledge
Information Transmission Concepts
Voice Equipment
Audio/Video Knowledge
Audio/Video Impairments
Analog Cable Television
Digital Cable Television
Network Models
Physical and Data Link Layer Concepts
Network Layer Concepts
Transport and Application Layer Concepts
Network Test Equipment
Transmission Systems
Ethernet Fundamentals
DataComm Fundamentals
Metro Ethernet Fundamentals
Storage Networking Fundamentals

Switching and Networking Courses

Telephony Fundamentals
Advanced course in Fundamental of Telecommunication
PSTN Design Services
PSTN Concepts Operation
Wireless Communications
Advanced SS7
Advanced GSM
Advanced GPRS
Advanced UMA/GAN
Advanced UMTS
Advanced WiMAX
Advanced Femto-Cell/3GPP-HNB
Advanced LTE/SAE

IP Based Technology Courses

TCP IP Fundamentals
Advanced IP
Intro to DSL
VoIP and IP Telephony
IPT and VoIP
Advanced RTP/RTCP
Advanced Sigtran
Advanced SIP

Security Courses

Information Security
Security Policy Design Implementation
Security Concepts Fundamentals
Security in the Mobile Workplace
Security Policy Design Implementation

Our Approach Towards Customizing Training Solutions

As an industry leader in training, we can augment your team to extend your product portfolio or generate a new curriculum. We have experience in custom development solutions for Instructor Led, Web-based and eLearning training. Plus, we have the instructional design experience to plug in only those pieces that are important to you.

TelecomMentor will be happy to customize our course content to meet your specific needs. We can integrate topics across our courses to deliver a custom solution “packages” to cover only the information important and individual or an or organization. These packages are designed to help teams learn new technologies quickly.

We take advantage of our experience and expertise to uniquely

- Analyze each opportunity to pinpoint and define requirements
- Design a detailed solution that uniquely matches agreed requirements
- Develop cost effective solutions working from an agreed design
- Implement solutions for a target audience
- Continuously evaluate delivery and content effectiveness to enhance the training experience

Our Commitment to Our Partners, University, College and Business

- Transfer Knowledge
- Enable Partners Leverage Their Knowledge
- Provide Expert Advice
- Meet Individual Needs
- Deliver High-Impact Programs

Data Communications Fundamentals

PROGRAM OVERVIEW

To be successful today, one must understand the technologies that underlie providers' various product and service offerings. This course enables that foundation, covering fundamental concepts beginning with an overview of the relationship between data communications and telecommunications, and introducing the notion of convergence. It then introduces the concepts of network models, protocols, layers, and protocol suites and suggests a five-layer model used in modern networks. The course discusses each of the five layers, exploring the core concepts and functions of each, examples of technologies, protocols, and services present in each layer. As each layer is explained, participants explore a hypothetical network to see where each layer lives.

Data Communications Fundamentals runs 3.9 hours, and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has six primary objectives:

- Define the terms telecommunications and data communications
- Describe today's trend towards convergence in telecommunications
- Define the terms protocol, model, protocol suite and layer
- Describe the OSI Reference Model and the TCP/IP model, and how they come together in a modern network
- Identify and describe the functions provided by each layer of the modern five-layer network model
- Describe example technologies and protocols at each layer of the modern five-layer network model

PROGRAM OUTLINE

Lesson 1: Telecomm, Datacomm & Convergence

- How / where we communicate
- End-to-end view of information
- Understanding four domains of convergence

Lesson 2: Communications Models

- Elements of various networks
- The communication problem
- Defining protocol, model, layer
- The OSI Reference Model
- The TCP/IP Model
- A 5-layer working model

Lesson 3: Physical Layer

- Core functions and applications
- Digitizing voice (sampling, quantizing, companding, encoding per Shannon and Nyquist)

Lesson 4: Data Link Layer

- Core functions and applications
- Examples (PPP, DOCSIS, Ethernet)

Lesson 5: Layer 2 Switching

- Packet switching (datagram/VC)
- Ethernet, Frame Relay, ATM

Lesson 6: Network Layer

- Core functions and applications
- Following a packet
- Routing, address resolution, CoS/QoS

Lesson 7: Transport Layer

- Core functions and applications
- Application addressing

Lesson 8: Application Layer

- Core functions and applications
- Service models
- Examples (FTP, NFS, DNS, HTTP, SMTP, IM, IP Telephony, SMTP, Telnet)

Ethernet Fundamentals

PROGRAM OVERVIEW

Ethernet has become, without question, the dominant LAN technology adopted by enterprise, small business, and home users alike. What makes this technology so dominant? Is it its simplicity? Is it that even though it has evolved it maintains strong links to its roots, ensuring seamless, non-intrusive evolution? This course provides you with an understanding of the basic concepts related to Ethernet. Beginning with an historical review of the technology, it explains concepts that have remained unchanged throughout the past 30 years. It continues with a look at the evolution of this technology from a simple, wire-based LAN technology to the more complex switch and VLAN-based technologies we find today, concluding with an examination of link aggregation and power over Ethernet.

Ethernet Fundamentals runs 2.6 hours, and includes audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has six primary objectives:

- Describe the relationship among Ethernet and routers, reference models and other IEEE standards
- Differentiate among four generations of Ethernet products, technologies and services
- Identify transmission rates and media options for Ethernet networks
- Define the term VLAN, and discuss its role and importance in Ethernet environments
- Describe power over Ethernet, and identify contexts in which it is used
- Describe link aggregation, and identify contexts in which it is used

PROGRAM OUTLINE

Lesson 1: Origins and Concepts

- In the beginning…
- Defining Ethernet
- Ethernet, layers and the IEEE
- Ethernet addressing / domains
- Where Ethernet lives today

Lesson 2: First and Second Generation Ethernet

- The bus topology
- 10 Mbps Ethernet over TP/fiber
- CSMA/CD
- Fast Ethernet
- Shared Ethernet scenarios

Lesson 3: Third Generation Ethernet – the Switch

- The performance problem
- From bridging to switching
- Half- to full-duplex Ethernet
- 10/100 Mbps switched Ethernet scenarios

Lesson 4: Going to Gigabits

- Bandwidth drivers and Moore's law
- Gigabit and 10 Gb Ethernet
- Application of 10 G variants

Lesson 5: Fourth Generation Ethernet – the VLAN

- Defining VLANs, and why we need them
- Interconnecting VLANs
- VLAN trunking
- Selecting the right switch for your network

Lesson 6: Ethernet Enhancements

- Power over Ethernet
- Link aggregation
- CoS/QoS

The Fundamentals of Storage Networking

PROGRAM OVERVIEW

Information and the knowledge gained from that information, is driving today's Internet-based economy. Information must be available and shareable by different computing platforms, anywhere in the world, at any time. As a result, data backup is a key action item for most businesses.

This course examines how to create effective storage networks, addressing topics such as the three key components of storage networks; differentiating between DAS, NAS, SAN, and CAS; protocols such as Fibre Channel, FC/IP, iSCSI, SATA, and Ethernet; examples of storage networks based on RPO/RTO criteria; and the challenges of storage.

The Fundamentals of Storage Networking runs 2.9 hours, and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has five primary objectives:

- Identify the fundamental concepts of storage networks
- Discuss the architectures, components, and protocols used in various types of storage networks
- Differentiate among a DAS, NAS, SAN, and CAS
- List the wiring options for a storage network
- Identify the various challenges of storage networking

PROGRAM OUTLINE

Lesson 1: Introduction to Storage Networks

- The importance of storage
- Defining storage networking
- Storage architectures
- Storage network components
- Comparing networking and storage

Lesson 2: Storage Network Components – Filing and Storing

- Key concepts – filing vs. storing
- Common storage types (tape, RAID, JBOD)
- Mirroring vs. replication
- Synchronous vs. asynchronous backups

Lesson 3: Storage Network Components – Wiring

- Key concept of wiring, and its characteristics
- Comparing DAS, NAS, SAN and CAS, and examples
- File vs. block level access

Lesson 4: Wiring Storage Networks

- ATA, IDE, and SCSI
- Fibre Channel and SATA
- FC/IP, iSCSI, and Ethernet

Lesson 5: Design Management Challenges

- The ROI and complexity of storage
- Examples (Tape, rapid recovery, CDP)

Lesson 6: Putting It All Together

- One size does not fit all
- Supporting RPO / RTO goals
- SANity check

Information and Transmission Concepts

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

General Telecommunications Knowledge is a three course series that deals with general concepts and terminology related to the information representation and transmission. In this first course, ***Information and Transmission Concepts,*** you will explore the use of bits to represent information, transmission media options, the distinction between analog and digital transmission, modulation techniques, types of transmission impairment, issues that determine maximum bit rates for a transmission facility, multiplexing techniques, and options for network topologies.

Information and Transmission Concepts runs 95 minutes, and includes eight lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Explain how various types of information can be represented and transmitted in both analog and digital systems across various media
- Identify several modulation techniques and their challenges
- Differentiate among five network topologies

PROGRAM OUTLINE

Lesson 1: Information Representation

- Explore the concept of a bit and how bits can be used to represent numbers, text, voice, video, and images

Lesson 2: Transmission Media

- Classifying various media (twisted pair, coaxial cable, optical fiber, wireless)

Lesson 3: Transmission Concepts

- Comparing analog and digital transmission systems

Lesson 4: Modulation Concepts

- Using analog and digital systems to carry bits
- Discuss ASK, PSK, FSK, QAM, TCM, 2B1Q, AMI, and Manchester encoding

Lesson 5: Transmission Impairments

- Differentiating between noise and distortion with examples

Lesson 6: Bandwidth Issues

- Principles governing maximum transmission rate within a channel (Shannon and Nyquist)

Lesson 7: Multiplexing

- The importance of muxing
- Types (FDM, TDM, CDM)

Lesson 8: Network Topologies

- Examines the five common types (ring, bus, tree, point-to-point, star)

Information Security Fundamentals

PROGRAM OVERVIEW

Security is on everyone's mind today. But it is not a product or a box (e.g., a firewall) that is purchased and plugged into a network. Nor is information security simply a technology; it is a process. Understanding these concepts is critical to understanding how technology, vendor products, and vendor services fit into the challenges customers face. Information security cannot be learned only by reading a book. It requires practice. Part of that practice includes understanding your network's vulnerabilities.

This course covers the fundamentals of information security: the security policy, the tools used to protect data, and responding to security incidents. The course combines technological detail and business issues to teach participants how to understand network attacks, classify the attacks, and prevent them.

Information Security Fundamentals runs 2.8 hours, and includes audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has five primary objectives:

- Define the concept of the CIA triad that underlies the principles of information security (InfoSec)
- Describe the components of a security policy
- Discuss the challenges related to implementing and maintaining the policy
- Identify the network components that should be secured in an enterprise network, and list common technologies used to do so
- Discuss the steps required to form an incident response team

PROGRAM OUTLINE

Lesson 1: Introduction to Information Security

- Understanding the inherent risk in communications
- Why security does not equal a firewall
- Defining information security
- The C-I-A triad
- InfoSec business drivers
- Where to begin the process

Lesson 2: Developing an InfoSec Policy

- The major steps of InfoSec
- Identifying assets to protect
- Determining risks and threats
- Risk factors
- InfoSec tools (physical, administrative, technical)
- Applying the tools to the C-I-A triad
- Security policy documents

Lesson 3: Technical Tools Used in InfoSec

- Implementing technical tools
- The security hierarchy
- Filters, firewalls and the DMZ
- Intrusion detection vs. prevention
- AAA and encryption
- Virtual private networks

Lesson 4: Implementing Information Security

- Management protocols
- Network, server, and desktop implementation
- Addressing the risks

Lesson 5: Incident Responsiveness

- Detecting when things go wrong
- The incident response plan

Introduction to DSL

PROGRAM OVERVIEW

Many people rely on high-speed Internet access for work and personal use. Digital subscriber line (DSL) technologies provide high-speed Internet access using the existing telephone connection. Variations of the technologies are also used to deliver T-1 and PRI business services.

This course describes DSL technologies and how they can be deployed to provide higher speed access to networks and offload packet data from the public switched telephone network (PSTN). Topics include local loop qualification issues; ADSL and RADSL technologies; G.Lite and UADSL customer premises arrangements; HDSL and HDSL2; SDSL and G.SHDSL; VDSL and VDSL2; and DSLAM architectures.

Introduction to DSL runs 1.4 hours, and includes audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has seven primary objectives:

- Provide definitions for key DSL terminology
- Identify various DSL services, and the relationships among them
- Discuss the ADSL family: ADSL/RADSL, G.Lite/UADSL
- Explain how HDSL/HDSL2 eases T-1/E-1 provisioning
- List and explain the benefits of VDSL
- Describe several issues/challenges with premises-based networks
- Explain the role and basic architecture of a DSLAM

PROGRAM OUTLINE

Lesson 1: DSL Overview

- Access issues and technologies
- Battle for the consumer
- Internet connectivity
- Analog loop characteristics
- Modern loop architecture
- The trouble with local loops
- The DSL family tree

Lesson 2: DSL Options

- Real world local loops
- DSL: analog or digital
- POTS with DSL
- The DSLAM

Lesson 3: Symmetrical DSLs

- HDSL as “repeaterless T-1”
- HDSL2
- SDSL and G.SHDSL
- HDSL4
- Summarizing symmetrical DSLs

Lesson 4: Asymmetrical DSLs

- ADSL / RADSL
- The RADSL edge
- Components of ADSL
- G.Lite and its components
- Summarizing asymmetrical DSLs

Lesson 5: VDSL

- Newer and better?
- VDSL Family
- VDSL: Future or not?

Lesson 6: Premises Issues

- The home LAN
- IP in the home and business
- Dealing with security

Metro Ethernet

PROGRAM OVERVIEW

Who would have imagined that when Ethernet was developed in the early 1970s, it would mature to be as fast as it has become, and it would be able to travel beyond 100 meters? Metro Ethernet technology plays an integral role in the telecom industry, eventually displacing older access options such as frame relay and ATM. Individuals in the industry must understand Metro Ethernet

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This course provides participants with an understanding of the basic concepts related to Metro Ethernet, beginning with a review of the Ethernet services market and Ethernet technology. It continues with a look at the Metro Ethernet Forum service specifications and attributes. Next, the course reviews the technologies used to implement Ethernet access in the metro and WAN core networks. The course concludes with a review of Ethernet as access to services and Ethernet as a service.

Metro Ethernet runs 1.9 hours, and includes audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has five primary objectives:

- Describe the components of Ethernet pertinent to Metro Ethernet
- Discuss the importance of Metro Ethernet in the networking market
- Describe the three service offerings for Metro Ethernet
- Explain two implementations of switched Ethernet services
- Explain two implementations of Ethernet point-to-point services

PROGRAM OUTLINE

Lesson 1: Ethernet Services Market

- Moving Ethernet from LAN to MAN to WAN
- Key players in the market
- Why carrier Ethernet?

Lesson 2: Ethernet Review

- A brief history of Ethernet
- Concepts and standards
- Hubbing and switching
- Virtual LANs
- The universal outlet

Lesson 3: Metro Ethernet Forum standards

- MEF service model components
- Metro Ethernet characteristics
- Ethernet in the metro market
- E-LAN and E-Line services
- Service attributes, traffic, and performance parameters
- Service multiplexing
- Class of service

Lesson 4: Ethernet Service Implementations

- Ethernet in carrier networks
- First mile access options (Native Ethernet, Ethernet over copper, Ethernet over SONET, Ethernet Passive Optical Network)
- Metro / WAN Ethernet options
- 802.1Q Framing, QinQ
- Trunking with 802.3ad link aggregation
- EVPNs in MPLS networks
- Virtual private wire and LAN services

Lesson 5: Ethernet Service Offerings

- Ethernet as access
- Ethernet metro access to a WAN service

Network and Test Equipment

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Program 2: General Telecommunications Knowledge is a three course series that deals with general concepts and terminology related to the information representation and transmission. In this third course of the series, ***Network and Test Equipment,*** we provide an overview of equipment commonly found in telecommunications networks. In this course, you will explore diagrams of residential, commercial and service provider networks and get a brief introduction to basic equipment found in these networks. You will also get a brief introduction to commonly used network test and analysis equipment.

Program 2, Course 3: Network and Test Equipment runs 36 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss the various equipment found in telecom networks
- Explore diagrams of residential, commercial, and service provider networks
- Provide a high-level overview of telecom network test equipment

PROGRAM OUTLINE

Lesson 1: Customer Premises Equipment

- Explore typical residential and commercial network elements and their roles
- Example pictures of actual equipment included

Lesson 2: Access Network Equipment

- Examine diagrams of typical multiple service operator (MSO) and local exchange carrier (LEC) access network equipment
- Example pictures of actual equipment included

Lesson 3: Transport Network Equipment

- Examines diagrams of a typical optical transport network deployed by either an MSO or LEC
- Click on various equipment elements to see photos and descriptions of each type, and the role each plays in the network

Lesson 4: Network Test Equipment

- Provides a high-level overview of network test and monitoring equipment commonly found in telecommunications networks

Security Policy Design, Implementation and Management Practices

PROGRAM OVERVIEW

Information security is not simply a technology; it is a process. To effectively implement an information security (InfoSec) program, companies must have a solid security policy and management best practices in place. This program examines the concepts underlying security policy design, implementation, and management. It follows the ***Fundamentals of Information Security*** ExperTech 2.0 and covers the steps involved in creating a solid information security policy, its implementation, and subsequent management best practices.

Security Policy Design, Implementation, and Management Practices runs 2.5 hours, and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has six primary objectives:

- Explain the principles of security management
- Define the need and purpose of a security policy
- Describe the steps involved in implementing an effective security policy
- Indentify vulnerabilities, risks, and threats that could be found within an organization
- Determine how to handle and address those risks and threats
- Evaluate effective and cost-efficient countermeasures to protect the organization

PROGRAM OUTLINE

Lesson 1: Introduction to Security Management

- The goals of security management
- Information owners and the security admin team
- Classifying data
- InfoSec requirements
- Security model importance

Lesson 2: The First Four Steps to Implementing a Security Policy

- The security model process
- Steps 1–4 details
- The countermeasure / risk relationship
- Identifying vulnerabilities
- How regulatory compliance affects the process

Lesson 3: Risk / Threat Assessment

- Identifying threats
- Determining / prioritizing risks
- Risk analysis techniques

Lesson 4: Qualitative and Quantitative Risk Analysis

- Quantitative components
- Qualitative analysis
- Value of countermeasures
- Examples

Lesson 5: Handling Risk

- How should risk be handled?
- Personnel and security
- The incident response plan

Lesson 6: The Second Half of Security Policy Development

- Steps 5–9
- Standards that enforce C-I-A
- Certification and accreditation

Security in the Mobile Workplace

PROGRAM OVERVIEW

Mobility isn't the next big thing—it **IS** the big thing. Laptop computers are the norm, allowing employees to be productive not only in the office, but also at home and on the road. BlackBerrys, PDAs, and other handheld devices and smartphones can be seen in nearly every traveler's hands. Now they are IP-capable, always on, and the risk of data breaches is higher than ever.

Today, mobility is bigger than Wi-Fi and cellular, and security is more than just a firewall. What happens when these two concepts meet? Challenges arise. Remote and mobile users are using a variety of applications on a variety of devices. Ensuring security is quite complex.

Security in the Mobile Workplace runs three hours and addresses the challenges of securing the mobile enterprise. It includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

The program has five primary objectives.

- Explain the difference between wireless access and mobility
- Discuss the phases of mobile evolution for a business
- Create a methodology for establishing holistic mobility
- Define the intersection of information security principles and mobility
- Identify the challenges mobility brings to business, and the tools that can mitigate the risks of mobile solutions

PROGRAM OUTLINE

Lesson 1: Mobility is Not Wireless

- The distinction between wireless, mobility, and portability
- Different users have different requirements
- The environment

Lesson 2: A Strategic Approach to Mobility

- The three phases of mobility evolution
- Mobile business drivers
- Key strategies for holistic mobility

Lesson 3: Information Security Principles

- The C-I-A triad
- Information security tools
- Identifying and mitigating risk

Lesson 4: The Challenges of the Mobile Workspace

- Complexity of mobility
- Top challenges/tradeoffs

Lesson 5: Tools to Mitigate the Risk

- Basic steps
- Identity/access management
- Endpoint security and NAC

Lesson 6: Planning for Success

- Golden rules/guidelines
- Resources

TCP/IP Network Concepts

PROGRAM OVERVIEW

The Internet has made TCP/IP the standard protocol suite for computer communications. This course examines TCP/IP and related protocols. It begins with an overview of the TCP/IP protocol suite and continues with an examination of the protocol suite's four layers. At each layer common protocols and their applications are examined.

TCP/IP Network Concepts runs 2.2 hours, and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has six primary objectives:

- Describe the TCP/IP protocol suite
- Identify the layers of the TCP/IP protocol suite, the protocols found at each layer, and the core function of each
- Explain what an IP address is, and describe its structure
- Explain the difference between public and private addresses
- Differentiate between connectionless and connection-oriented protocols
- Examine three popular application services: DNS, World Wide Web, and email

PROGRAM OUTLINE

Lesson 1: Introduction
- The need for communication
- TCP/IP protocol suite
- Applications using TCP/IP

Lesson 2: The TCP/IP Suite
- Defining TCP/IP
- Moving between layers
- An example

Lesson 3: The Network Interface Layer
- Examining the layer according to OSI
- Common Network Interface layer protocols

Lesson 4: The Internet Layer
- Examining the layer
- IP, IP routing, and datagrams

Lesson 5: IP Addressing
- Classes, ranges, subnetting
- CIDR, NAT, private/public addresses
- IPv6

Lesson 6: IP Routing
- Routing tables and protocols
- ARP, Routing decision
- Following a packet

Lesson 7: Transport Layer
- Examining the layer
- Connectionless vs. connection-oriented
- TCP vs. UDP

Lesson 6: The Application Services Layer
- Examining the layer
- Looking at DNS, WWW, and email

The Telecommunications Industry

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

General Industry Knowledge is a one course program designed to introduce you to the telecommunications industry. *The Telecommunications Industry* deals with general concepts and terminology related to the telecommunications industry. You begin by exploring the industry historically, using interactive timelines that explore the emergence and development of the industry. You then learn to identify the primary types of telecommunications companies and to define critical regulatory and industry terminology. Finally, you explore the characteristics of voice, video, and data networks and discover what "convergence" means.

The Telecommunications *Industry* runs 85 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has four primary objectives:

- Identify and describe important historical events in telecom
- Discuss the various types of key players in the industry
- Review the primary telecom regulatory terminology and issues
- Differentiate between traditional voice, data and video networks

PROGRAM OUTLINE

Lesson 1: A Brief History of Telecommunications

- Explore timelines for the development of voice, data and television network infrastructures

Lesson 2: Industry Players and Their Roles

- LATA definition
- Types of companies delivering telecom services in North America

Lesson 3: Regulatory Terminology and Issues

- Primary standards organizations and regulatory agencies
- Terminology definitions (tariff, access charge, reciprocal compensation, universal access fund, cable franchise agreement)

Lesson 4: Basic Network Types

- Differentiate between traditional voice, data and video networks
- The concept of convergence
- Moving towards a single network infrastructure
- Differentiating circuit and packet switching

Telephony Fundamentals

PROGRAM OVERVIEW

This course covers fundamental concepts related to voice networks. The course emphasizes circuit-based voice networks, but it also includes an overview of packet-based voice networks. Concepts covered include industry history, network elements and organization, voice digitization, signaling, access and trunking options, traffic engineering concepts, and regulatory issues.

Telephony Fundamentals runs 3.6 hours, and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has eight primary objectives:

- Describe the history of the telephone industry
- Describe the components of the telephone network
- Differentiate between analog/digital and information/signals, and provide examples to underscore the concepts
- Describe the four steps used in the digitization of voice
- Differentiate between circuit and packet voice networks
- Describe how the telephone network is engineered for quality of service
- Explain the operation of a signaling network (e.g., SS7)
- Identify and describe trunking options

PROGRAM OUTLINE

Lesson 1: The telephone is invented

- Milestones
- Terminology (LATA, LEC, IXC, ITSP)

Lesson 2: The Telephone Network

- Understanding sound propagation
- The traditional ILEC PSTN network, connecting to IXC
- PBX, key systems, Centrex
- Traditional vs. IP Telephony

Lesson 3: Voice Transmission

- Terminology (frequency, passband, TDM, analog vs. digital; content vs. signaling)
- Digitizing voice (sampling, quantizing, companding, encoding per Shannon and Nyquist)

Lesson 4: Switching

- Types of switches
- Media gateway functionality

Lesson 5: Traffic Engineering

- Blocking vs. queuing
- Erlang calculations
- Trunk groups, law of large numbers
- Packet voice systems

Lesson 6: Signaling and SS7

- Purpose of signaling
- In-band vs. out-of-band
- The SS7 network

Lesson 7: Access Options

- POTS, ISDN, DSL, HFC, cellular systems

Lesson 8: Trunking Options

- T-Carrier (T-1/3), SONET

Transmission Systems

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

General Telecommunications Knowledge is a three course series that deals with general concepts and terminology related to the information representation and transmission. In this second course, ***Transmission Systems,*** we explore a range of different transmission systems used to deploy carrier and MSO networks including Microwave systems, the North American digital system hierarchy, the synchronous optical network (SONET) and next generation SONET as well as wave division multiplexing systems, and the hybrid fiber/coax network, including both transport and access components of the various network types.

Transmission Systems runs 88 minutes, and includes six lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Explain transmission systems in carrier and MSO network deployments
- Examine the digital signal hierarchy from DS-0 to SONET, next-generation SONET systems, and wavelength division multiplexing
- Explore the structure of the MSO hybrid fiber/coax infrastructure

PROGRAM OUTLINE

Lesson 1: Microwave Systems

- Explores the nature of microwaves and how they can be deployed as satellite and terrestrial systems

Lesson 2: Digital Signaling Hierarchy

- Describes the transmission rates, cable plant, and general functions of DS-0, DS-1, and DS-3 transmission environments

Lesson 3: SONET

- Examines the SONET standards and architecture, including sublayers (Path, Line, Section, Photonic) and rings (UPSR, 2F-BLSR, 4F-BLSR)

Lesson 4: Next Generation SONET

- Explores SONET enhancements (VCAT, LCAS and GFP)

Lesson 5: Wavelength Division Multiplexing

- Identifies the need for WDM and differentiates among the types (WWDM, CWDM, DWDM)

Lesson 6: Hybrid Fiber/Coax

- Structure of an HFC network including components (optics, cable, nodes, amplifiers), frequency allocation and end equipment (CMTS, HDT, MTA/eMTA, modem, set-top box)

Analog Cable Television

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Audio/Video Knowledge is a four course series that deals with concepts and terminology related to services focused on the delivering audio and video services over a cable network. In this first course of the series, ***Analog Cable Television***, we provide a history of television, examine the structure of the cable distribution plant, and explore the organization of the frequency spectrum. We consider how video capture, transmission, and reconstruction are accomplished using analog technologies, and conclude with a look at how color information was added to the original black and white television signal.

Analog Cable Television runs 99 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Provide an overview of analog television transmission concepts
- Explain and differentiate among the details associated with black/white monaural television signals vs. color stereo transmission
- Discuss the details behind various modulation techniques required for cable television infrastructures

PROGRAM OUTLINE

Lesson 1: A Brief Look at Cable TV

- Review the early development of TV and cable TV
- Discuss the regulatory aspects of cable TV
- Describe the basic structure of the cable TV network, and address the challenges of service delivery

Lesson 2: Baseband Monochrome Video and Monaural Audio

- Examine the concepts of scanning (interlaced vs. progressive) as they relate to video
- Explore the structure of the analog television signal (blanking interval, fields, frames) and the relationship between frame speed and flicker
- Explain synchronization and strategies for audio encoding

Lesson 3: Video and Audio Modulation

- Differentiate between frequency and amplitude modulation, and discuss why each is used in analog television
- Describe the structure of the 6 MHz television channel

Lesson 4: Color Television and Stereo Sound

- Explain how color information is organized and transmitted with stereo sound incorporated
- Explore ancillary signals sent together with analog TV signals
- Differentiate among NTSC, PAL, and SECAM standards

Audio and Video Equipment

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Audio/Video Knowledge is a four course series that deals with concepts and terminology related to services focused on the delivering audio and video services over a cable network. In this third course of the series, ***Audio and Video Equipment***, we provide an overview of the architecture of a cable television system, including signal acquisition systems, signal processing elements, signal transport, and subscriber equipment. The course includes a discussion of video services including broadcast video, narrowcast video, and video on demand (VOD). Ad and emergency alert insertion are also reviewed.

Audio and Video Equipment runs 92 minutes, and includes five lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Provide a detailed review of the architectural and equipment elements that are part of a cable television network
- Explore the types of audio/video services delivered over that network
- Explore the relationship among various services and spectrum usage, including program access control mechanisms

PROGRAM OUTLINE

Lesson 1: Cable System Architecture

- Identify and describe the four components of the cable network architecture
- Discuss signal acquisition, processing, transport, and subscriber terminal equipment

Lesson 2: Service Requirements

- Examine broadcast, narrowcast, and interactive video services
- Explore the relationship among various services and spectrum usage, including program access control mechanisms

Lesson 3: Ad Insertion and Emergency Alerts

- Review mechanisms for analog and digital insertion of alerts and advertisements
- Discuss the concept of video on demand (VOD)

Lesson 4: Video Receiver Architectural Elements

- Explain the basic functions of a modern video receiver (set-top box)
- Examine the various cable connectors implemented by these systems

Lesson 5: HFC Architectural Elements

- Examine the architectural elements of the hybrid fiber/coax (HFC) cable plant, including elements of both the coaxial distribution network (amplifiers, subscriber tapes, coaxial cable) and the optical distribution network (optical nodes and fiber)

Audio/Video Impairments and Testing

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but can not attend a more traditional classroom-based, leader-led program.

Audio/Video Knowledge is a four course series that deals with concepts and terminology related to services focused on delivering audio and video services over a cable network. In this fourth and final course of the series, ***Audio/Video Impairments and Testing***, we provide an overview of signal impairments that can occur in analog and digital television distribution systems. We describe test equipment and tests that can be used to diagnose these problems. The course includes a discussion of the eye pattern and constellation diagram in analyzing a transmission cable plant.

Audio/Video Impairments and Testing runs 63 minutes, and includes two lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has two primary objectives:

- Examine the types of impairments that can occur in an audio/video network
- Examine the types of testing and test equipment that are used to diagnose these problems

PROGRAM OUTLINE

Lesson 1: Cable System Architecture

- Describes the differences between how analog and digital signals degrade
- Explores the design compromises required in cable TV system design
- Defines the term decibel, differentiates between bit error rate (BER) and modulation error rate (MER)
- Describes five signal problems that can negatively affect audio/video quality

Lesson 2: Service Requirements

- Identifies six pieces of test equipment and describes their basic function
- Identifies and describes audio and video tests
- Explores the use of the eye pattern and constellation diagrams to diagnose transmission problems
- Defines the concept of a sweep

Digital Cable Television

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Audio/Video Knowledge is a four course series that deals with concepts and terminology related to services focused on the delivering audio and video services over a cable network. In this second course of the series, ***Digital Cable Television***, we provide an overview of the current and historical drivers for digital television, a review of digital compression techniques (with an emphasis on MPEG), and an overview of options for transporting digital signals to the subscriber. The course concludes with an examination of digital modulation strategies.

Digital Cable Television runs 107 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Provide an overview of digital television transmission concepts
- Explain and differentiate among the details associated with various digital compression and transport techniques and standards
- Discuss the details behind various strategies for modulating digital information for transport

PROGRAM OUTLINE

Lesson 1: From Analog to Digital

- Introduce the drivers for the move to digital television
- Examine historical issues related to satellite and HDTV
- Assess the advantages of moving to digital television

Lesson 2: Digital Compression

- Explore concepts related to the compression of digital television including digitization of video, entropy and predictability, spatial and temporal compression, and MPEG standards
- Discuss audio digitization and compression techniques

Lesson 3: Digital Transport

- Present options for the transport of digital audio and video
- Examine the basic features of the MPEG-2 Systems Layer
- Identify sources of digital television standards

Lesson 4: Digital Modulation

- Explore strategies for modulating digital information for transport including BPSK, QPSK, QAM, and 8-VSB
- Examine signal measurement techniques

IP Telephony and Voice over IP

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Voice Knowledge is a four course series that deals with concepts and terminology related to the transmission of voice services. In this fourth and final course of the series, ***IP Telephony and Voice over IP***, we provide high level coverage of voice over IP and IP telephony concepts and implementations. In this course, you will explore the motivation for the packet switched architecture and compare it to the traditional circuit switched architecture. You will also explore the requirements and components of a VoIP/IPT network and examine three different service models for the delivery of IP telephony.

IP Telephony and Voice over IP runs 89 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss and explain basic networking concepts, and describe them using three different modeling approaches
- Explore well-known protocol examples used in today's networks
- Examine how IEEE standards relate to a modern data network model

PROGRAM OUTLINE

Lesson 1: A Simple Telephone Call

- Explore the physical elements of the traditional PSTN telephone connection
- Identify what the provider and customer are responsible for
- Describe the process of making a telephone call

Lesson 2: Digital Loop Carrier

- Describe the role of the digital loop carrier
- Terminology defined, including TR-009 and GR-303 interfaces

Lesson 3: Digital Telephone Service

- Identifies and describes the telephone systems used in business (key systems, PBXs) and describes the function of each

Lesson 4: Cable Telephone Service

- Explores the switched and VoIP approaches to delivering voice services in a cable network
- Looks at the equipment required and the functions the pieces of equipment provide

Network Layer Concepts

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Data Knowledge is a five course series that deals with concepts and terminology related to data services. In this third course of the series, ***Network Layer Concepts***, we provide an overview of the third layer of the modern data networking model. We explore the core role of the Network Layer: routing. You will examine the dominant Network Layer protocol in use today: the Internet Protocol (IP). You will also examine the IP address and associated addressing issues. The course concludes with a brief introduction to MPLS and a deeper look at the concepts of class of service (CoS) and quality of service (QoS).

Network Layer Concepts runs 117 minutes, and includes six lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss and explain the details of the Network Layer, including its role and relationship in the modern five-layer model
- Explore details underlying IP addressing, routing, and CoS/QoS
- Examine the details and benefits of an MPLS network structure

PROGRAM OUTLINE

Lesson 1: Network Layer Concepts

- Explore the primary function of the Network Layer: routing
- Define terms such router, packet, routing table, and congestion

Lesson 2: Internet Protocol

- Explore characteristics of IP, looking at packet structure, and the process of routing data through a datagram network

Lesson 3: IP Addressing

- Describe IP address structure and address allocation in the Internet
- Discuss subnetting and IP multicasting concepts

Lesson 4: Routing Tables and Routing Protocols

- Explore the roles and structure of a routing table and how tables are maintained using routing protocols
- Discuss address resolution

Lesson 5: Multiprotocol Label Switching

- Examine the components of an MPLS network
- Differentiate between MPLS control and forwarding planes
- Discuss the benefits of an MPLS network

Lesson 6: CoS and QoS

- Differentiate between Class of Service (CoS) and Quality of Service (QoS)
- Identify core requirements for delivering CoS and QoS in a packet network

Network Models and Suites

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but can not attend a more traditional classroom-based, leader-led program.

Data Knowledge is a five course series that deals with concepts and terminology related to data services. In this first course of the series, ***Network Models and Suites***, we introduce you to basic data networking concepts and how they are described using a model. The course then introduces some well known examples in today's networks. You will learn the meaning and use of the terms protocol, model, protocol suite, and layer in the context of data networking; how the OSI Reference Model and TCP/IP models have come together in a modern network; and explore example technologies and protocols at each layer.

Network Models and Suites runs 61 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss and explain basic networking concepts, and describe them using three different modeling approaches
- Explore well-known protocol examples used in today's networks
- Examine how IEEE standards relate to a modern data network model

PROGRAM OUTLINE

Lesson 1: Basic Data Networking Terminology

- Explain the meaning and use of the terms protocol, model, protocol suite, and layer in the context of data networking

Lesson 2: Data Network Models

- Describe the OSI Reference Model and the TCP/IP model, and how they come together in a modern network
- Identify the functions provided by each layer of the modern five-layer network model

Lesson 3: Example Technologies

- Explore example technologies and protocols at each layer of the modern five-layer network model

Lesson 4: IEEE Standards Models

- Describe how the IEEE 802 standards model relates to the modern data reference model

Physical and Data Link Layer Concepts

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Data Knowledge is a five course series that deals with concepts and terminology related to data services. In this second course of the series, ***Physical and Data Link Layer Concepts***, we provide an overview of the first two layers of the modern data networking model. You will explore concepts such as topologies, multiplexing, framing, and error detection, and define terms like DTE and DCE. You will also examine common Physical and Data Link Layer implementations like Ethernet, Data over Cable Service Interface Specification, universal serial bus, and frame relay.

Physical and Data Link Layer Concepts runs 110 minutes, and includes seven lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss and explain the Physical and Data Link Layers, including their roles and relationship in the modern five-layer model
- Discuss the challenges of each of these two layers
- Provide examples of the technologies found at each layer

PROGRAM OUTLINE

Lesson 1: Overview of the Physical Layer

- Explore the role of the Physical Layer, describing its function and defining terms such as DTE and DCE

Lesson 2: Physical Layer Concerns

- Examine the primary challenges of the Physical Layer – media and connectors, topologies, bit representation (encoding), transmission rates, distance limitations, and multiplexing

Lesson 3: Examples of Physical Layer Technologies

- Explore examples of Physical Layer implementations including Ethernet, Wi-Fi, and USB

Lesson 4: Overview of the Data Link Layer

- Explore the primary role of the Data Link Layer: delivering error-free information

Lesson 5: Data Link Layer Concerns

- Examine the primary challenges of the Data Link Layer: framing, addressing, error detection, line access control and switching

Lesson 6: Data Link Layer Switching

- Describe switching details; differentiate between circuit and packet networks, virtual circuit vs. datagram networks, and QoS / CoS

Lesson 7: Examples Data Link Layer Technologies

- Explore examples of Data Link Layer implementations including DOCSIS, Ethernet, frame relay, and ATM

PSTN Concepts and Operation

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Voice Knowledge is a four course series that deals with concepts and terminology related to the transmission of voice services. This first course of the series, ***PSTN Concepts and Operation,*** introduces the concepts underlying the public switched telephone network (PSTN), its components, and its operation. You will learn about the elements of the local and toll networks, network timing, how voice is digitized, voice quality assessment, the structure of telephone numbers, access network options, switch components, trunking systems, and signaling. The course concludes with a look at operations, administration, maintenance, and provisioning (OAM&P) issues.

PSTN Concepts and Operation runs 111 minutes, and includes nine lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Explain voice transmission and the structure of the PSTN
- Identify and describe the voice access network components
- Review OAM&P challenges within a voice network

PROGRAM OUTLINE

Lesson 1: PSTN Structure

- Explore typical residential and commercial network elements and their roles

Lesson 2: Timing And Synchronization

- The importance of timing in the PSTN, the BITS system, and the strata of clocks
- Timing in a cable network

Lesson 3: Voice Characteristics

- Examines the nature of voice, the role of the telephone
- Digitization of voice and techniques for assessing voice quality, especially over IP

Lesson 4: Telephone Numbers

- Structure of international numbers and the North American Numbering Plan

Lesson 5: Access Networks

- Access options (POTS, ISDN, DLC, HFC, and cellular)

Lesson 6: Switches

- Elements of a circuit vs. packet switched network

Lesson 7: Trunking

- Primary trunking systems used in North America

Lesson 8: Signaling / SS7

- The role of signaling and SS7, differentiating in-band vs. out-of-band signaling

Lesson 9: OAM&P

- Operations and Business Support Systems, Telecom Management Network , and FCAPS principles

PSTN Design and Services

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Voice Knowledge is a four course series that deals with concepts and terminology related to the transmission of voice services. In this third course of the series, ***PSTN Design and Services,*** we explore issues related to the design and deployment of circuit-based and packet-based voice networks. You will learn about the differences between queuing and blocking networks, how the PSTN is engineered for quality of service, how Erlang tables are used, and how trunk groups and the law of large numbers applies. You will also examine quality issues in packet networks and explore a number of service aspects including Centrex and CLASS services.

PSTN Design and Services runs 65 minutes, and includes three lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Explore the design concepts and challenges of deploying voice networks, including the elements required for quality of service
- Identify and discuss the principles of traffic engineering
- Explain Centrex, CLASS services, and ISDN concepts

PROGRAM OUTLINE

Lesson 1: Traffic Engineering

- Define the term *traffic engineering*
- Discuss the differences between queuing and blocking networks
- Describe Erlang tables and the Law of Large Numbers and the strategies for determining call volumes

Lesson 2: Engineering in Action

- Describe where traffic engineering principles are needed and applied in the circuit-based PSTN
- Explore the elements required to provide quality of service (QoS) in a packet-based voice network

Lesson 3: Voice Services

- Identifies several voice-related services including Centrex, CLASS services, and ISDN

Security Concepts

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Data Knowledge is a five course series that deals with concepts and terminology related to data services. In this fifth and final course of the series, ***Security Concepts***, we provide an overview of information security concepts. You will discuss the goals and objectives of information security, identify types of security threats, and explore the tools that can deal with them. The course also examines firewalls, intrusion detection and prevention systems, AAA, cryptology, and virtual private networks.

Security Concepts runs 127 minutes, and includes six lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Provide an overview of Information Security concepts
- Identify various types of risks and threats, and address risk mitigation techniques and tools
- Examine the details, protocols, and benefits of VPNs

PROGRAM OUTLINE

Lesson 1: Information Security Landscape

- Introduce the language of InfoSec: the C-I-A triad, InfoSec planning, security domains, and the three tools of security protection

Lesson 2: Threats and Vulnerabilities

- Examine specific InfoSec threats and where they can occur in modern networks
- Explore natural and malicious threats (worms, viruses, social engineering, and DoS attacks)

Lesson 3: Firewalls and Intrusion Detection

- Differentiate among firewalls, intrusion detection and intrusion prevention systems, including DMZ architectures

Lesson 4: Cryptography

- Explore the purpose of cryptography and three forms of cryptography (secret key, public key, and hash functions)
- Discuss attack methodologies

Lesson 5: AAA

- Discuss authentication, authorization, and accounting (AAA) concepts; multifactor authentication and the architecture to support AAA

Lesson 6: Virtual Private Networks

- Define VPNs and explore venues in which VPN technology is found
- Examine VPN deployment models and protocols by layer of operation

Transport and Application Services Layer Concepts

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Data Knowledge is a five course series that deals with concepts and terminology related to data services. In this fourth course of the series, ***Transport and Application Services Layer Concepts***, we provide an overview of the top two layers of the modern data networking model. You will explore concepts such as connectionless and connection-oriented, error correction and detection, the client/server relationship, and peer-to-peer relationships. You will also examine several Transport Layer and Application Services Layer protocols, such as UDP, TCP, HTTP, FTP, RTP, TLS, and DNS.

Transport and Application Services Layer Concepts runs 90 minutes, and includes six lessons of audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Discuss and explain the Transport and Application Layers, including their role and relationship in the modern five-layer networking model
- Explore details underlying IP addressing, routing and CoS/QoS
- Examine the details and benefits of an MPLS network structure

PROGRAM OUTLINE

Lesson 1: Overview of the Transport Layer

- Explore the primary function of the Transport Layer, end-to-end communication, and what this responsibility entails

Lesson 2: Transport Layer Concerns

- Examine other Transport Layer functions including connection-oriented and connectionless operations, error detection and correction, identification of application services, and flow control
- Explore security and timing considerations

Lesson 3: Example Transport Layer Protocols

- Identify and describe four common examples of Transport Layer protocols: UDP, TCP, Real-time Transport Protocol (RTP), and Transport Layer Security (TLS)

Lesson 4: Overview of Application Services Layer

- Explore the primary function of the Application Services Layer, providing standardized services for application communication

Lesson 5: Application Services Layer Roles and Relationships

- Discuss information syntax and semantics
- Explore client / server roles and relationships

Lesson 6: Example Application Services Layer Protocols

- Describe DNS, FTP, Telnet, SMTP, HTTP, SNMP and IM protocol details and roles

Voice Equipment

PROGRAM OVERVIEW

The ***Telecommunications Technical Curriculum (TTC)*** has a total of five programs, each of which consists of one or more courses. TTC is a modular, yet comprehensive program designed around the needs of those who want the details but cannot attend a more traditional classroom-based, leader-led program.

Voice Knowledge is a four course series that deals with concepts and terminology related to the transmission of voice services. In this second course of the series, ***Voice Equipment,*** the equipment components found in typical telephony systems is described. You will learn about the physical elements of the traditional PSTN telephone connection and learn how to identify the responsibilities of the provider and customer. Elements discussed include digital loop carrier equipment, key systems, PBXs, digital phones, and the telephony components provided in a cable system.

Voice Equipment runs 60 minutes, and includes four lessons of audio, interactive elements, review slides, section knowledge checks and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has three primary objectives:

- Identify and describe equipment components found in telephony
- Discuss the digital loop carrier system and its interfaces
- Explore switched and VoIP approaches to delivering voice services

PROGRAM OUTLINE

Lesson 1: A Simple Telephone Call

- Explore the physical elements of the traditional PSTN telephone connection
- Identify what the provider and customer are responsible for
- Describe the process of making a telephone call

Lesson 2: Digital Loop Carrier

- Describe the role of the digital loop carrier
- Terminology defined, including TR-009 and GR-303 interfaces

Lesson 3: Digital Telephone Service

- Identifies and describes the telephone systems used in business (key systems, PBXs) and describes the function of each

Lesson 4: Cable Telephone Service

- Explores the switched and VoIP approaches to delivering voice services in a cable network
- Looks at the equipment required and the functions the pieces of equipment provide

VoIP and IP Telephony

PROGRAM OVERVIEW

When one thinks about convergence concepts, what often comes to mind is VoIP. This course provides you with an understanding of voice over Internet Protocol (VoIP) and Internet Protocol telephony (IPT). It defines VoIP/IPT, explains why voice over packet is feasible, and gives some issues surrounding VoIP. It continues with a discussion of the three major protocols used in VoIP: Session Initiation Protocol, H.323, and Media Gateway Control. The course concludes with a discussion of the network assessment process, VoIP deployment options, and differentiation of premises and hosted IPT.

VoIP and IP Telephony runs 2.6 hours and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has seven primary objectives:

- Describe voice over Internet Protocol (VoIP) and IP telephony (IPT)
- Discuss why voice over packet is feasible
- Explain the impact of VoIP on carriers and consumers
- Describe the functions of H.323, Session Initiation Protocol (SIP), and the Media Gateway Controller (MEGACO) protocol
- Discuss the VoIP network assessment process
- Discuss four models of VoIP deployment
- Differentiate between premises-based and host-based IPT

PROGRAM OUTLINE

Lesson 1: Introduction to Voice over IP

- What is VoIP?
- Differentiate between VoIP and IP telephony
- Why packetize voice
- The new voice "stack"
- Building an IPT network
- VoIP acceptability factors
- Key VoIP standards

Lesson 2: IP Telephony Using H.323

- IP telephony standards
- Gateways and gatekeepers
- H.323 operational components and concepts

Lesson 3: IP Telephony Using SIP

- The Session Initiation Protocol
- SIP server types
- SIP signaling and operational overview
- Real-Time Protocol

Lesson 4: MEGACO: Gateway to the PSTN

- Overview of MEGACO
- Gateway control operations
- UDP transport of MEGACO
- MEGACO call flow

Lesson 5: Planning for IPT

- Assessing the technology
- Data network baseline
- Security vulnerabilities
- Power requirements
- IPT migration strategies
- Deployment models
- On-premises vs. hosted IPT solutions

Wireless Communications

PROGRAM OVERVIEW

Wireless communications plays a significant role in local, metropolitan, and wide area networking. Although wireless telephony service has been around since the 1980s, with over 3 billion users worldwide, there is still much confusion in the marketplace about its terms and technologies.

This course addresses radio waves, antenna operation, and issues surrounding line of sight and interference; the architecture of cellular radio and the techniques used for demand assigned multiple access (e.g., FDMA, TDMA, CDMA, and OFDMA); wireless LAN, MAN, and WAN systems; and 3G mobile telephony.

Wireless Communications runs 3.5 hours and includes audio, interactive elements, review slides, section knowledge checks, and a final exam. The participant can expect to spend about twice this amount of time to complete the course.

This program has six primary objectives:

- Describe the attributes of radio waves, and explain the operation of a radio antenna, discussing the relationship between line of sight and interference
- Describe the basics of cellular radio, including the assignment of radio channels to users
- Discuss the operation of FDMA, TDMA, CDMA, and orthogonal frequency division multiplexing (OFDM)
- Describe wireless LAN operations, and explain how the deployment and performance of wireless LANs are related
- Describe Wireless WANs and WiMAX and their applications
- Discuss the three generations of mobile telephony, and describe the evolutionary process of moving to 3G mobile telephony

PROGRAM OUTLINE

Lesson 1: Radio Wave Behavior

- Radio channel definitions
- Attenuation and interference

Lesson 2: Antenna Systems

- Conventional and smart antenna systems
- Relative power and MIMO

Lesson 3: Line of Sight and Interference

- Fresnel zone
- Coverage, capacity, and quality

Lesson 4: Cellular Radio

- Cellular radio infrastructure
- Frequency reuse, cell sectors

Lesson 5: Demand Assigned Multiple Access

- Frequency vs. time division duplex
- FDMA, TDMA, and CDMA

Lesson 6: Orthogonal Frequency Division Multiplexing

- Subcarrier definition
- OFDM access / transceivers

Lesson 7: Wireless LANs

- Wireless LAN architectures
- The 802.11 family (a, b, g, n)

Lesson 8: Wireless LAN Deployment

- Site surveys and performance
- Mesh networks

Lesson 9: Wireless MANs

- The 802.16 family
- WiMAX applications / services
- Technology updates

Lesson 10: Mobile Telephony

- The paths to cdma2000 and UMTS

IP Multimedia Subsystem (IMS)

Advanced Femto-Cell/3GPP-HNB

PROGRAM OVERVIEW

Advanced Femto/HNB course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced Femto/HNB training provides good understanding of the Femto/HNB signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- Femto/HNB Overview & architecture
- Function sof 3GPP HNB nodes/protocols
- 3GPP HNB Interfaces
- SCTP/HNBAP/RUA protocols
- 3GPP HNB signaling procedures

A femto cell is a device used to improve mobile network coverage in small areas. Femto cells connect locally to mobile phones and similar devices through their normal GSM, GPRS, or UMTS connections, and then route the connections over a broadband internet connection back to the mobile network, bypassing the normal cell towers.

Although this course requires no previous knowledge or understanding of Femto/HNB, a good understanding of telecommunication network and GSM/UMTS technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: Femto Cell/HNB Overview

- What is Femto Cell ?
- Femto cell advantage
- 3GPP Femto cell
- High level requirements

Lesson 2: Femto/HNB Architecture & Nodes

- 3GPP Iu-Based HNB Architecture
- 3GPP HNB Interfaces
- 3GPP Femto logical entities Home Node B (HNB)
- 3GPP Femto logical entities Security Gateway (SeGW)
- 3GPP Femto logical entities HNB Management System (HMS)
- 3GPP Femto logical entities HNB Gateway (HNB-GW)

Lesson 3: Femto/HNB Protocols

- 3GPP HNB Control Plane
- Iuh interface protocol stacks
- SCTP
- Home Node B Application Part
- RANAP User Adaption
- O&M for HNB Provisioning Procedure

Lesson 4: Femto/HNB Signaling

- HNB Registration
- HNB Deregistration
- UE Registration
- Direct Transfer
- Connectionless Transfer
- Disconnect HNB
- UE De-Registration

Advanced Fundamental of Telecommunication

PROGRAM OVERVIEW

Advanced Fundamentals of Telecommunication course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes. Advanced Fundamentals of Telecommunication training provides a complete introduction of telecommunication concepts and gives very good understanding of the telecommunication networks, elements and models.

This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- Basic Concepts
- Switching Concepts
- Communication Networks
- Network Models
- Data & Signals
- Multiplexing

Although this is a foundation course and requires no previous knowledge or understanding of telecommunications topics, a basic understanding of data communications would be beneficial.

PROGRAM OUTLINE

Lesson 1: Basic Concepts
- What is telecommunication?
- Components of a Telecommunication System
- Data Flow
- Communication Node

Lesson 2: Switching Concepts
- Switching Networks
- Circuit Switching
- Packet Switching

Lesson 3: Communication Networks
- Data Networks
- Local Area Network
- Wide Area Network
- Metropolitan Area Network
- Internet

Lesson 4: Network Models
- Different Layering Architectures
- OSI Model
- Layered Architecture
- TCP/IP Protocol Suite

Lesson 5: Data & Signals
- Analog and Digital Signal
- Time and Frequency domain representation
- Transmission Impairment
- Modulation

Lesson 6: Multiplexing
- Frequency Division Multiplexing
- Time Division Multiplexing
- Interleaving
- Transmission Techniques

Advanced GPRS

PROGRAM OVERVIEW

Advanced GPRS course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced GPRS training provides good understanding of the GPRS signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- 2.5 G architecture
- GPRS Air interface
- GPRS routing area/ frame/Modulation concepts
- GPRS physical and logical channels
- GPRS E2E signaling procedures and protocols
- GPRS access and core network

General Packet Radio Services (GPRS) is a packet-based wireless communication service that provides high data rates and continuous connection to the Internet for mobile phone and computer users. The higher data rates allow users to take part in video conferences and interact with multimedia Web sites and similar applications using mobile handheld devices as well as notebook computers.

Although this course requires no previous knowledge or understanding of GPRS, a good understanding of GSM technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: GPRS Overview
- Goals of GPRS
- GPRS Applications
- GSM -> GPRS

Lesson 2: GPRS Architecture
- GSM Architecture
- GSM/GPRS Architecture
- GPRS Core Network Enhancements
- GSM vs GPRS
- Channel Sharing in GSM and GPRS

Lesson 3: GPRS Air Interface
- GPRS Air Interface
- Channels
- Channel coding schemes

Lesson 4: GPRS Interface & Protocols
- User Plane/Control Plane
- MS-BSS Interface
- MS-SGSN Interface
- BSC-SGSN Interface
- Gn Interface GTP Functions

Lesson 5: GPRS Signaling
- GPRS Uplink Access
- GPRS Downlink Access
- GPRS Attach
- SGSN Routing Area Update
- GPRS PDP Activation

Lesson 6: GPRS Concepts
- Mobile states
- GMM States
- RR States
- GPRS MS Classes

Advanced GSM

PROGRAM OVERVIEW

Advanced GSM course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced GSM training provides good understanding of the GSM signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- 2 G architecture
- GSM Air interface
- GSM location area / cell/frequency/frame/Modulation concepts
- GSM physical and logical channels
- GSM E2E signaling procedures and protocols
- GSM access and core network

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM differs from first generation wireless systems in that it uses digital technology and time division multiple access transmission methods.

Although this course requires no previous knowledge or understanding of GSM, a basic understanding of communication network, SS7 and OSI model would be beneficial.

PROGRAM OUTLINE

Lesson 1: GSM Overview
- What is GSM?
- GSM Frequency

Lesson 2: GSM Architecture
- GSM Network Architecture
- Radio Subsystem
- Network Subsystem (NSS)
- Operation Subsystem (OSS)
- BTS/BSC/MSC

Lesson 3: GSM Concepts
- Geographical Characteristics
- Cell Characteristics
- Cellular Concept

Lesson 4: GSM Air Interface
- Air Interface
- FDMA/TDMA
- Bursts and
- Logical Channels
- Common Control Channels
- Dedicated Control Channels

Lesson 5: GSM Protocol Architecture
- Protocol Architecture Signaling LAPDm/RR
- BTS-BSC Interface
- BSC-MSC Interface
- MS-MSC Interface

Lession 6: GSM Signaling
- RR/CN Connection Setup/Release
- Location Update
- Mobile Originated Call
- Mobile Terminating Call
- Handover

Advanced IP

PROGRAM OVERVIEW

Advanced IP course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced IP training provides good understanding of the IP signaling, message format and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- IP Overview
- IP Subnets & Addresses
- IP Routing
- IP Header
- ICMP Protocol
- TCP Protocol
- UDP Protocol

The Internet Protocol (IP) is a protocol used for communicating data across a packet-switched internetwork using the Internet Protocol Suite, also referred to as TCP/IP. IP is the primary protocol in the Internet Layer of the Internet Protocol Suite and has the task of delivering distinguished protocol datagrams (packets) from the source host to the destination host solely based on their addresses.

Although this course requires no previous knowledge or understanding of IP, a basic understanding of communication technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: IP Overview
- What is IP ?
- IP History/Functions
- IP Datagram Fragmentation

Lesson 2: IP Addresses
- Format
- Address Class/usage
- IP Addressing
- Subnetting

Lesson 3: IP Routing
- Processing & Delivery of IP datagram
- Routing table
- Route Aggregation

Lesson 4: IP Header
- IP Packet Format
- IP Header Format

Lesson 5: Internet Control Message Protocol
- What is ICMP ?
- ICMP Packet Format
- ICMP Message Types
- PING

Lesson 6: Transmission Control Protocol
- What is TCP ?
- TCP/IP Protocol Architecture
- TCP services
- TCP Header Format

Lesson 7: User Datagram Protocol
- What is UDP ?
- UDP/IP Protocol Architecture
- UDP Header Format

Advanced LTE/SAE

PROGRAM OVERVIEW

Advanced LTE/SAE course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced LTE/SAE training provides good understanding of the LTE/SAE signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- Evolved 3GPP architecture
- LTE Air interface
- LTE physical and logical channels
- E-UTRAN Interfaces
- LTE E2E signaling procedures and protocols
- LTE Nodes eNB/MME/SGW/PDN-GW
- S1/X2 Interfaces

LTE (Long Term Evolution) is initiated by 3GPP to improve the mobile phone standard to cope with future technology evolutions and needs. Requirements include reduced cost per bit, increased service provisioning – more services at lower cost with better user experience, flexibility of use of existing and new frequency bands, simplified architecture, open interfaces and reasonable terminal power consumption.

Although this course requires no previous knowledge or understanding of LTE, a good understanding of telecommunication network and UMTS technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: LTE Overview

- Evolution
- Need of LTE
- High Level Requirements
- High level architecture for the evolved system
- LTE-SAE Nodes
- Functional Architecture E-UTRAN EPC
- LTE-SAE Interfaces

Lesson 2:Evolved UTRAN

- EUTRAN Architecture
- eNode B
- Radio Interface User Plane
- Radio Interface Control Plane
- Frame Structure
- Physical channels
- Transport Channels
- MAC / RLC
- PDCP / RRC
- X2 Interface
- X2AP Protcol

Lesson 3:Evolved Packet Core

- MME
- Serving Gateway (S-GW)
- PDN Gateway (P-GW)
- S1 Interface
- S1AP Protcol
- Security

Lesson 4: LTE Signaling

- Random Access Procedure
- Initial Context Setup procedure
- Attach procedure
- Detach Procedure
- Handover

Advanced RTP/RTCP

PROGRAM OVERVIEW

Advanced RTP/RTCP course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced RTP/RTCP training provides good understanding of the RTP/RTCP signaling, message format and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- RTP/RTCP Overview & Functions
- RTP/RTCP packet types
- RTP/RTCP packet format & Fields
- RTP/RTCP Usage scenarios

The Real-time Transport Protocol (RTP) defines a standardized packet format for delivering audio and video over the Internet. It was developed by the Audio-Video Transport Working Group of the IETF and first published in 1996 as RFC 1889, and superseded by RFC 3550 in 2003. RTP is used extensively in communication and entertainment systems that involve streaming media, such as telephony, video teleconference applications and web-based push to talk features. RTP is usually used in conjunction with the RTP Control Protocol (RTCP). While RTP carries the media streams (e.g., audio and video) or out-of-band signaling (DTMF), RTCP is used to monitor transmission statistics and quality of service (QoS) information.

Although this course requires no previous knowledge or understanding of RTP/RTCP, a basic understanding of VOIP & IP technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: RTP/RTCP Overview
- What is RTP ?
- RTP History
- Motivation
- RTP Advantage
- What is RTCP ?
- RTP/RTCP over Transport Protocols

Lesson 2: RTP Formats
- RTP Packet Format
- RTP Header Description

Lesson 3: RTCP Functions & Formats
- RTCP Functions
- RTCP Packet Types
- Sender Report (SR)
- Receiver Report (RR)
- Source Description (SDES)
- Goodbye RTCP Packet (BYE)

Lesson 4: Translators & Mixers
- RTP Translators and Mixers
- Mixers Vs Translators
- RTCP Processing in Translators
- RTCP Processing in Mixers

Lesson 5: RTP Profiles
- RTP Profiles
- Audio Profile
- Video Profile

Lesson 6: RTP Usage Scenarios
- Multicast Audio Conference
- Audio and Video Conference
- RTP/RTCP - Unicast
- RTP Usage in VOIP/Telecom

Advanced Sigtran

PROGRAM OVERVIEW

Advanced Sigtran course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes. Advanced Sigtran training provides good understanding of the Sigtran signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- SIGTRAN overview & architecture
- SIGTRAN Functional Model
- Signaling Transport Components
- SIGTRAN protocols - SCTP, IUA, M2UA, M2PA, M3UA, SUA
- Sigtran Signaling Procedures
- Sigtran Message format details
- Sigtran deployment architecture
- Sigtran in Telecom networks

Sigtran is a set of protocols defined to transport SS7 messages over IP networks. SIGTRAN allows IP networks to inter-work with the traditional SS7 network and vice versa. The SIGTRAN protocol stack consists of a common signaling transport protocol (Stream Control Transmission Protocol (SCTP)) and an adaptation layer protocol (M2PA, M2UA, M3UA, and SUA).

Although this course requires no previous knowledge or understanding of Sigtran, a basic understanding of SS7 & IP technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: Sigtran Overview & Architecture

- SIGTRAN Introduction
- SIGTRAN Functional Model
- Signaling Transport Components
- Sigtran Architecture

Lesson 2: Sigtran Protocols

- SCTP
- M3UA
- M2UA
- M2PA
- SUA
- IUA

Lesson 3: Sigtran in Telecom Networks

- Sigtran in 2G/3G Networks
- M3UA ISUP Message Transport
- M3UA SCCP User Transport
- M2UA SS7 Transport
- M2PA Signalling Transport
- SUA SCCP User Transport

Lesson 4: Sigtran Signaling

- SCTP Startup
- SCTP Data Transfer
- SCTP Association Shutdown
- M3UA Establishment of Traffic
- M3UA Normal Withdrawal

Advanced SIP

PROGRAM OVERVIEW

Advanced SIP course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced SIP training provides good understanding of the SIP signaling, message format and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- SIP Overview & architecture
- SIP Protocol Description
- SIP Call Flows
- SIP Security
- SIP usage in Telecom Networks

The Session Initiation Protocol (SIP) is a signalling protocol, widely used for setting up and tearing down multimedia communication sessions such as voice and video calls over the Internet. Other feasible application examples include video conferencing, streaming multimedia distribution, instant messaging, presence information and online games. The protocol can be used for creating, modifying and terminating two-party (unicast) or multiparty (multicast) sessions consisting of one or several media streams. The modification can involve changing addresses or ports, inviting more participants, adding or deleting media streams, etc.

Although this course requires no previous knowledge or understanding of SIP, a basic understanding of VOIP & IP technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: SIP Overview
- What is SIP ?
- SIP History
- SIP Standards
- SIP working groups
- Why SIP ?
- SIP Features

Lesson 2: SIP Protocol Description
- SIP Architecture
- Building blocks of SIP Network
- SIP User Agent
- SIP Proxy
- SIP Registrar
- SIP Redirect Sever
- SIP Protocol Functional Layers
- SIP Messages
- Location service

Lesson 3: SIP Call Flow
- SIP Registration
- SIP Session Establishment
- Session Establishment Proxies
- SIP REDIRECTION
- Unsuccessful Scenarios

Lesson 4: SIP Security
- Attacks and Threats
- Security Services
- Security Mechanisms

Lesson 5: SIP in Telecom Networks
- SIP Conference
- SIP Conference Call Flow
- SIP to PSTN
- SIP in IMS Network

Advanced SS7

PROGRAM OVERVIEW

Advanced SS7 course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes. Advanced SS7 training provides good understanding of the SS7 signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- SS7 (Signaling System 7) Network Architecture
- Signaling Network Elements: SSPs, STPs and SCPs
- Signaling Network Structures
- SS7 Protocols & Protocol Stacks
- SS7 Signal Units
- Signaling Links
- Message Transfer Part (MTP) Level 1-3
- SCCP, TCAP and ISUP
- SS7 in Mobile Networks

Common Channel Signaling System No. 7 (i.e., SS7 or C7) is a global standard for telecommunications defined by the International Telecommunication Union (ITU) Telecommunication Standardization Sector (ITU-T). The standard defines the procedures and protocol by which network elements in the public switched telephone network (PSTN) exchange information over a digital signaling network to effect wireless (cellular) and wireline call setup, routing and control.

Although this course requires no previous knowledge or understanding of SS7, a basic understanding of telecommunication network and OSI models would be beneficial.

PROGRAM OUTLINE

Lesson 1:SS7 Overview

- What is SS7?
- SS7 History
- SS7 Objectives
- SS7 Network Elements
- SS7 Links
- OSI vs. SS7
- SS7 Protocol Layers
- SS7 Functional Architecture

Lesson 2:SS7 Protocol Description

- MTP1
- MTP2
- MTP3
- ISUP
- TUP
- SCCP
- TCAP

Lesson 3:SS7 in Telecom Networks

- SS7 in 2G/3G Networks
- PSTN, PSTN-2G/3G Control Plane
- 2G, 3G core network Control Plane
- 2G/3G access network Control Plane

Lesson 4:SS7 Signaling

- Normal Alignment
- Signalling Link Activation
- Signalling Link Handling
- Basic Call Setup/Release

Advanced UMA/GAN

PROGRAM OVERVIEW

Advanced UMA/GAN course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced UMA/GAN training provides good understanding of the UMA/GAN signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- UMA/GAN Overview & Architecture
- Function of UMA/GAN nodes/protocols
- UMA/GAN Interfaces
- Protocol Architecture
- Messages & Signaling Scenarios

Unlicensed Mobile Access or UMA, is the commercial name of the 3GPP Generic Access Network, or GAN standard. GAN is a telecommunication system which extends mobile services voice and data applications over IP access networks. The most common application of GAN is in a dual-mode handset service where subscribers can seamlessly roam and handover between WiFi access points and GSM/GPRS/UMTS network using a GSM/Wi-Fi dual-mode mobile phone. GAN enables the convergence of mobile, fixed and Internet telephony, sometimes called Fixed Mobile Convergence.

Although this course requires no previous knowledge or understanding of UMA/GAN, a basic understanding of GSM & IP technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: UMA/GAN Overview

- What is UMA/GAN?
- Advantage for carriers
- Advantage for subscribers

Lesson 2: UMA/GAN Architecture

- UMA/GAN Functional Architecture
- UMA/GAN Features
- Access Point
- GANC/UNC
- Security Gateway
- Mobile Station

Lesson 3: UMA/GAN Protocols & Interfaces

- UMA/GAN – Reused Protocols
- CS/PS Control Plane
- CS/PS User Plane
- Generic Access Resource Control
- Generic Access Circuit Switched Resources
- Generic Access Packet Switched Resources
- MS - Mode of operation

Lesson 4: UMA/GAN Signaling

- EAP-SIM Authentication
- Discovery Procedure
- Registration procedure
- GA-CSR Connection Establishment
- GA-CSR Connection Release
- Mobile Originated Call
- Mobile Terminated Call
- Handover
- GA-PSR GPRS Signalling Procedures

Advanced UMTS

PROGRAM OVERVIEW

Advanced UMTS course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced UMTS training provides good understanding of the UMTS signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- 3G 3GPP architecture
- UMTS Air interface
- UMTS physical and logical channels
- UTRAN Interfaces
- UMTS E2E signaling procedures and protocols
- RLC/MAC/RRC/NBAP/RNSAP/RANAP protocols
- UMTS access and core network

UMTS stands for Universal Mobile Telecommunications System. UMTS is also known as third-generation, or 3G. Third-generation systems are designed to include such traditional phone tasks as calls, voice mail, and paging, but also new technology tasks such as Internet access, video, and SMS, or text messaging.

Although this course requires no previous knowledge or understanding of UMTS, a basic understanding of telecommunication network and GSM/GPRS technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: UMTS Overview
- What is UMTS ?
- Cellular Evolution
- UMTS network overview
- 3GPP UMTS Architecture
- UTRAN Interfaces

Lesson 2: UMTS Air Interface
- Physical Radio channel
- Why spreading ?
- OVSF code generation
- Scrambling codes
- UL/DL Physical Channels
- Physical Layer Procedures
- RLC/MAC/RRC

Lesson 3: UTRAN
- 3GPP UTRAN Architecture
- Node B/RNC functions
- Serving/Drift concept
- UTRAN- SRNS Relocation
- Iub/Iur interface
- NBAP
- RNSAP

Lesson 4: UTRAN Iu Interface
- Iu interface
- Iu-CS/PS Protocol structure
- RANAP
- UMTS CS/PS Control/User Plane

Lesson 5: UMTS Signaling
- RRC Connection Establishment
- RRC/CN Connection Release
- Location Update
- CS/PS Call
- Soft/Hard Handover

Advanced WiMAX

PROGRAM OVERVIEW

Advanced WiMAX course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

Advanced WiMAX training provides good understanding of the WiMAX signaling network, architecture and protocols. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- WiMAX architecture
- Function of WiMAX nodes
- WiMAX Interfaces
- Protocol Architecture
- WiMAX Air Interface
- WiMAX Procedures

WiMAX, the Worldwide Interoperability for Microwave Access, is a telecommunications technology aimed at providing wireless data over long distances in a variety of ways, from point-to-point links to full mobile cellular type access. It is based on the IEEE 802.16 standard, which is also called WirelessMAN. The name "WiMAX" was created by the WiMAX Forum, which was formed in June 2001 to promote conformance and interoperability of the standard.

Although this course requires no previous knowledge or understanding of WiMAX, a basic understanding of telecommunication network and IP technology would be beneficial.

PROGRAM OUTLINE

Lesson 1: WiMAX Overview

- What is WiMAX ?
- WiMAX Advantages
- WiMAX specifications
- WiMAX spectrum
- WiMAX deployment

Module II WiMAX Architecture

- ASN Reference Model
- Wi-MAX Base Station
- Access Service Network ASN Gateway
- Connectivity Service Network
- Network Access Provider
- Network Service Provider
- WiMAX AAA Framework

Lesson 3: WiMAX Air Interface

- Air Interface Protocol Architecture
- Physical Layer
- Modulation
- Medium Access Layer

Lesson 4: WiMAX Protocol Architecture & Procedures

- E2E Protocol Structure
- Network Discovery and Selection
- Authentication in WiMAX
- IP addressing in WiMAX
- Data Path Setup
- Subscriber Traffic Handling
- WiMAX QoS Architecture

Lesson 5: WiMAX Mobility

- ASN Anchored
- CSN Anchored

Advanced HSPA

PROGRAM OVERVIEW

This is a self-paced e-learning course and part of TelecomMentor-NgnGuru advanced training series. Seminar style presentations provide telecom professionals with easy access to the information they need. Topics are presented by instructors renowned for their technical expertise, industry experience, and outstanding presentation style.

Advanced HSPA course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

This course provides a good understanding of HSPA background, architecture, protocols, Nodes and services.. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- HSPA Architecture Impact
- HSPA Air Interface Enhancements
- HSPA Features
- HSPA Signaling Procedures

High Speed Packet Access, or “HSPA,” is driven by the desire to provide end-users with an enhanced experience in UMTS through higher data transfer rates.

Although this course requires no previous knowledge or understanding of HSPA, a good knowledge of UMTS technology would be beneficial for anyone attending this course.

PROGRAM OUTLINE

Lesson 1: HSPA overview
- Benefits
- Applications
- Requirements

Lesson 2: UMTS Overview
- Physical Channels
- Release 99 Limitations

Lesson 3: HSDPA Overview
- HSDPA Features
- Shared channel transmission
- Adaptive Modulation and Coding (AMC)
- Fast Hybrid Automatic Repeat Request (H-ARQ)
- Fair and fast scheduling at Node B
- Short transmission time interval (TTI)

Lesson 4: HSDPA Channels & Protocol Architecture
- High Speed Channels
- HSDPA Protocol Architecture
- MAC Architecture
- MAC-hs

Lesson 5: HSDPA Operations & Mobility Procedures

Lesson 6: HSUPA Overview
- HSUPA Enhancements
- UMTS Architecture with HSUPA

Lesson 7: HSUPA Features
- Hybrid Automatic Repeat reQuest

Lesson 8: HSUPA Channels & Protocol Architecture
- HSUPA Channels
- HSUPA Protocol Architecture
- MAC Architecture
- MAC-e/es

Lesson 9: HSUPA Operations & Mobility Procedures

Advanced IMS

PROGRAM OVERVIEW

This is a self-paced e-learning course and part of TelecomMentor-NgnGuru advanced training series. Seminar style presentations provide telecom professionals with easy access to the information they need. Topics are presented by instructors renowned for their technical expertise, industry experience, and outstanding presentation style.

Advanced IMS course is available online and on CD-ROM. It includes streaming audio/video presentation and student quizzes.

This course provides a good understanding of IMS background, architecture, protocols, Nodes and services.. This course is developed utilizing the latest learning and delivery techniques that offer unrivalled development opportunities.

Upon completion of this course, the participants will have a good understanding of:

- IMS architecture
- SIP Protocol
- IMS Nodes
- IMS Interworking
- IMS signaling procedures
- Emergency services in IMS

IMS architecture defined by the 3GPP/3GPP2 group, is designed to enable seamless deployment of applications across a core network based on the open standards of the Internet Protocol.

Although this course requires no previous knowledge or understanding of IMS, a good knowledge of fixed and wireless networks would be beneficial for anyone attending this course.

PROGRAM OUTLINE

Lesson 1: IMS Introduction
- What is IMS?
- What does IMS provide?
- IMS Benefits
- High level requirements

Lesson 2: SIP Overview
- Where we can use SIP ?
- SIP Architecture
- SIP Messages

Lesson 3: IMS Networks Architecture
- Reference Points
- Key IMS Concepts
- P-CSCF, I-CSCF, S-CSCF
- BGCF, MRF, HSS
- SGW/MGW/MGCF

Lesson 4: Interworking with CS Networks
- Interworking Reference Model
- Interworking between IM CN subsystem and CS network

Lesson 5: IMS Procedures & Signaling Scenarios
- Establishing IP-Connectivity Access Network (IP-CAN) bearer
- Proxy CSCF discovery
- Registration with S-CSCF

Lesson 6: Emergency service handling
- Reference Architecture
- Emergency CSCF

Lesson 7: TISPAN IMS
- NGN Functional Architecture
- NGN IMS Overview