Course Catalog

Basics Courses

Basics of Telephony (Circuit-Switched) Networks [Two Days]

Prerequisite: None

Who should attend: Any employee who needs to understand the applications, functions, systems, and workings of a Telephony Network.

Description: This course describes the infrastructure of the Circuit-Switched Telephony Network. It begins with an overview of how the network evolved and how it has to be backwards-compatible with many decisions made last century. Several different methods of voice and data transmissions are described including some of the advances of Wavelength Division Multiplexing (WDM). The Switching, Signaling and Routing sections describe how calls are dialed and switched across today's network and how features of the future will be integrated with these systems. Circuit-switched Virtual Private Networks are explained and their applications, which are still popular today, are examined.

The course ends with a review of the opening case study to apply information learned

Note: This course parallels the ***Basics of Data (Packet-Switched) Networks*** course for the beneficial result of easier comparisons between these two differing technologies.

1. Introductions
    a. How History affects our Present
    b. Tradeoff lessons
    c. The Curriculum-Wide Model
    d. Pac-Man Model
    e. Global Definitions/Vocabulary
    f. Case-Study Introduced
2. Transmission
    a. Analog and Digital Basics
    b. Circuit Multiplexing Schemes
    c. Telco Distribution "Problems"
    d. SONET/SDH and WDM
    e. Satellite Service
    f. New Services "on the horizon"
3. Switching
    a. Why Switching?
    b. Analog versus Digital Switching
    c. PBXs versus Centrex
    d. Concentration versus Switching
    e. Types of Switches and Services
4. Signaling and Routing
    a. In-Band versus Out-of-band
    b. Telephone Numbering Plans
    c. Local and Global Examples
    d. Discriminating and Directing
    e. Engineering issues
5. Virtual Private Networks (VPNs)
    a. Definition and Services
    b. Architectures and Addressing
    c. Build or Buy
    d. Standards or Proprietary
    e. Multi-vendor challenges
6. Case Application (Battle of Gettysburg – Revisited)
    a. Setting the Scene
    b. What services do we need?
    c. What are the alternatives?
    d. What steps do we take
    e. What to watch for
7. Final Assessments

Basics of Data (Packet-Switched) Networks [Two Days]

Prerequisite: None

Who should attend: Any employee who needs to understand the applications, functions, systems, and workings of a Packet-Switched Network.

Description: This course describes the infrastructure of a Packet-Switched Data Network. It begins with an overview of data networks evolution and revolution and the split focus in the early days. Various forms of data transmission are described and contrasted and differences in switching and routing are clarified. Addressing, one of the most challenging aspects to a data network, is carefully explained with clear explanations given for private and public addresses as well as globally-significant and locally-significant addresses.

The course ends with a review of the opening case study for application of information learned.

Note: This course parallels the ***Basics of Telephony (Circuit-Switched) Networks*** course for the beneficial result of easier comparisons between these two differing technologies.

1. Introduction and Overview
    a. From Mainframe to Desktop
    b. The Curriculum-Wide Model
    c. The Network Software Model
    d. Global Definitions/Vocabulary
    e. Case-Study Introduced
2. Transmission
    a. Analog and Digital Basics
    b. Packet Multiplexing Schemes
    c. Fiber and Wireless for Data
    d. Telco Distribution "Problems"
    e. xDSL Product Family
    f. Cable Networks for Access
3. Switching
    a. Buffering and Broadcasting
    b. Layer 2 Switching: LAN/WAN
    c. Hubs, Switches, Routers, Gateways
    d. Edge Switches
    e. QoS Alternatives
    f. Core Switches (MPLS)
4. Signaling and Routing
    a. Addresses
    b. Routable/Non-Routable Addresses
    c. Myths of Routing
    d. Router Functions
    e. NATs and NPATs
    f. RIP, OSPF and BGP4
5. Virtual Private Networks
    a. Definition and Services
    b. Addressing
    c. Build or Buy
    d. QoS and SLAs
    e. Encryption versus Tunneling
    f. New competitors
6. Case Application
    a. Setting the Scene
    b. What services do we need?
    c. What are the alternatives?
    d. What steps do we take
    e. What to watch for
7. Final Assessments

Basics of Wireless (Access) Networks [Two Days]

Prerequisite: None

Who should attend: Any employee who needs to understand the applications, functions, systems, and workings of a Wireless (Access) Network

Description: This course describes the infrastructure of a Wireless (Access) Network. It begins with an overview of wireless networks evolution and digital revolution. Various forms of voice encoding and transmission are described and contrasted (FDMA, TDMA, GSM). Public and private wireless applications are described along with their strengths and weaknesses. Fixed and mobile networks are also examined with careful attention paid to the impact on available bandwidth. Emerging and future applications are described so that the student knows the various alternatives that are being considered.

1. Wireless Overview
    a. Network Model
    b. Implementation Models
    c. Public versus Private Nets
    d. Fixed versus Mobile Wireless
2. Analog Systems (1st Generation)
    a. System Design Objectives
    b. MSAs versus RSAs
    c. Coverage and Competition Today
    d. Multiplexing Schemes
3. PCS/Digital Systems (2nd Generation)
    a. System Design Objectives
    b. BTAs versus MTAs
    c. New Coverage Plans
    d. Different Competitive Sets
    e. New Multiplexing Schemes
4. The Interim Step (named 2.5 Generation)
    a. System Design Objectives
    b. Overlaid systems
    c. Evolutionary Coverage and Competition
    d. GSM makes it's North American move
5. Third Generation (3G)
    a. System Design Objectives
    b. New Network Requirements
    c. Coverage expectations
    d. Mobility and Data Expectations
    e. What Protocols now?
6. Network Concerns
    a. New requirements
    b. Equipment Evolution
    c. Directions for the Future
    d. Issues to watch
7. Private System Alternatives
    a. Fixed Wireless Systems
    b. Mobile Wireless Systems
8. Newly-emerging alternatives
    a. Ideas for new offices
    b. Ideas for expanding offices