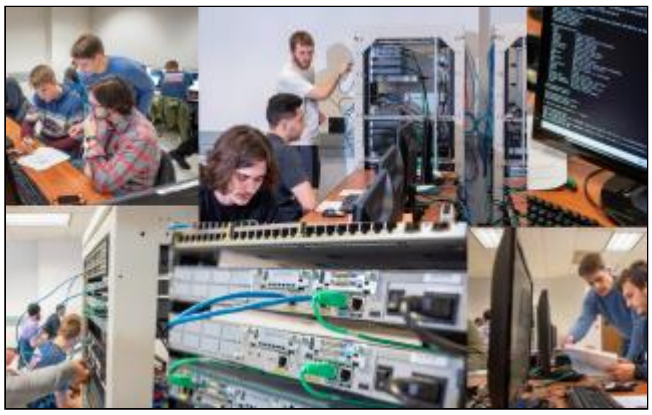
Hands-On

Internetworking Essentials

Course Description

This Hands-On 3-day course orientates the telecom professional to the data and networking environment. The growth of the information age is being driven by Internetworking. This course will cover the essentials of data and networking environments and their concepts, components, applications, and many acronyms will be examined in detail as the overall picture of these technologies are simplified.

This course will provide practical Hands-On Set-Up, Configuration, Implementation and troubleshooting of These Basic and Complex Technologies.



Students Will Learn

- **Connections of Internet / Intranet & its Structure.**
- **Data and Networking Components Interconnect.**
- **LANs, WANs, MANs Work Together as a Network**
- **Ethernet LANs Gigabit, V-LANs & Wireless and their Components, Design Rules, Advantages & Disadvantages.**
- **Bridges, Switches, & Routers and How They are Currently Used Today**
- **Successfully Build & Test an Ethernet Network Using Hubs, Bridges, Routers & Switches**
- **Stress Test an Ethernet Network and Observe Results.**
- **Construct a Switched Ethernet Network**
- **View various Protocols, Data Packets & Traffic Analysis using a Protocol Analyzer.**
- **Engage in the Configuration of a TCP/IP Host.**
- **Construct a Router Network In-Class.**
- **Analyze Network Traffic in Class & Do Trend Analysis**
- **Track the Major Users of the Network Utilizing Sophisticated Monitoring Tools**
- **Configure the Router Network for Voice Over IP**
- **Various WAN Services**
- **And more**

Target Audience

Anyone responsible or Interested in a Real-World hands on approach in Data Networking Technologies, Techniques, Applications and Design. Telecom professionals, outside plant / field, network operations, central office, technical marketing, help desk, project managers, network engineers, network administrators, voice engineers, and those in charge of converging voice and data networks.

Prerequisites

None.

Course Outline

Module I: NETWORKING TECHNOLOGY REVIEW

DATA NETWORKING
CHARACTERISTICS OF OPEN SYSTEMS
COMMUNICATIONS AMONG OPEN SYSTEMS
LAYERING ARCHITECTURE BENEFITS
OSI LAYERS
STANDARDS BODIES
OSI REFERENCE MODEL
IMPORTANT PROTOCOL FUNCTIONS
NETWORKING ARCHITECTURE LAYERS
INTER-LAYER DEPENDENCIES
PEER-TO-PEER COMMUNICATIONS
OSI LAYERS - OVERVIEW OF FUNCTIONS
DATA TRANSFER IN OSI MODEL
DATA NETWORKS

Module II: LAN CONCEPTS, STANDARDS AND SPECIFICATIONS

EMERGENCE OF LANS
ADVANTAGE OF LANS
LANS FUTURE GROWTH??LANS AND THE OSI MODEL
LAN INTERCONNECTION TO THE WAN
LAN STANDARDIZATION
MAJOR LAN STANDARDS
802.X PROTOCOL ARCHITECTURE & OSI
802.X PROTOCOL ARCHITECTURE
IEEE 802.3 LAN SPECIFICATIONS
IEEE 802.3 STANDARDS
LAN LOGICAL/PHYSICAL TOPOLOGIES
LAN ACCESS TECHNIQUES

NETWORK OPERATING SYSTEMS

Module III: LAN PROTOCOL CONCEPTS

EVOLUTION OF ETHERNET
CSMA/CD ACCESS
ETHERNET SPECIFICATIONS
ETHERNET (IEEE 802.3)
10 BASE 2
10 BASE 5
10 BASE T
100 BASE X
GIGABIT ETHERNET
ETHERNET DATA LINK LAYER
LINK LAYER ADDRESSING
MEDIA ACCESS CONTROL ADDRESSES
UNDERSTANDING MAC ADDRESS
ETHERNET FRAME FORMATS
ETHERNET VERSION 2 FRAME STRUCTURE
ETHERNET 802.3 FRAME STRUCTURE
NETWARE 'RAW' FRAME STRUCTURE
IEEE 802.3 SNAP
802.3 WITH 802.2 FRAME
PROTOC OL STACK COMPARISONS

Module IX: LAN COMPONETS AND IEEE DEFINITIONS

INTERNETWORKING ELEMENTS
NETWORK INTERFACE CARDS
REPEATERS
ETHERNET HUBS
SHARED vs SWITCHED HUBS
SHARED MEDIA HUBS
SWITCHED MEDIA HUBS
SHARED vs SWITCHED NETWORKS
BRIDGES
ROUTERS

Module X: LAN/WAN INTERCONNECTION

INTERNETWORKING
INTERNETWORKING DEVICES
INTERNETWORKING WITH BRIDGES AND ROUTERS AND SWITCHES
ETHERNET BRIDGES
HOW ETHERNET BRIDGES WORK
STORE AND FORWARD

ETHERNET BRIDGE FUNCTIONS
BRIDGING LOOPS
SPANNING TREE
802.x SPECIFICATION
THE NEED FOR BANDWIDTH
LAN PERFORMANCE
SWITCHES
SWITCH CONFIGURATION
SWITCHED ETHERNET
INTERNETWORKING WITH ROUTERS
ROUTER CONNECTIVITY
ROUTER PROTOCOL ARCHITECTURE
CONNECTING LAN TO WAN - X.25
CONNECTING LAN TO WAN - ATM/FRAME RELAY
HIGH-SPEED SWITCH CONNECTIONS
SWITCHES, BRIDGES, ROUTERS
COMPARISON OF LAYER 3 SWITCHES
APPLICATION GATEWAYS
GATEWAYS
CONNECTING LAN TO WAN
LAN INTERCONNECTION TO THE INTERNET

Module XI: EMERGING ETHERNET SOLUTIONS

FAST ETHERNET
HALF AND FULL DUPLEX TRANSMISSION
SHARED vs SWITCHED ETHERNET
BASIC LAN SWITCHING DEFINED
STORE AND FORWARD LATENCY
CUT-THROUGH SWITCHING
FULL DUPLEX COMMUNICATION
WHICH NETWORK HAS BETTER PERFORMANCE?
OPTIMIZING SWITCHED NETWORKS
SWITCHING EXAMPLES
GIGABIT ETHERNET
ETHERNET OVER 'DARK FIBER'
VLANS
VLAN CONCEPTS
VLAN IMPLEMENTATION
IEEE FRAME EXTENSION

Module XII: INTERNET/INTRANET INTERCONNECTION

INTERNET ORGANIZATIONS
RFCS
INTERNET ARCHITECTURE
MORE ON INTERNETWORKING
INTERNET

AN IP NETWORK
PROTOCOL ENCAPSULATION
IP TECHNOLOGY
IP STRUCTURE
IP ADDRESSES
IP ADDRESS CLASSES
IP ADDRESS RANGES
SPECIAL IP ADDRESSES
SUBNET ADDRESSING
DHCP
IPV6
IPV6 FEATURES
IPV6 HEADER
INTRANETS AND EXTRANETS

Module XIII: TCP/IP ARCHITECTURE

LAYER 4 PROTOCOLS
RELIABLE AND UNRELIABLE PROTOCOLS
CONNECTION ORIENTED PROTOCOLS
CONNECTIONLESS PROTOCOLS
TCP/IP
OSI
TCP/IP PROTOCOL ARCHITECTURE
APPLICATION PROTOCOLS
TCP/IP CORE APPLICATIONS
HTTP
WWW

Module IX: TCP/IP ARCHITECTURE

DNS
DNS NAME FORMAT
DOMAIN NAMES
TOP LEVELS OF DOMAIN SPACE
TOP LEVEL DOMAIN NAMES
IPSEC
AUTHENTICATION
AUTHENTICATION PROTOCOLS
FILTERING AND PROXY SERVICE
OSI AND TCP/IP

Module X: VOICE OVER IP (VOIP)

VOIP

IP TELEPHONY APPLICATION CATEGORIES
IP TELEPHONY SERVICE TYPES
IP TELEPHONY - BUSINESS APPLICATIONS
TYPICAL ENTERPRISE IMPLEMENTATION
VOICE TRANSPORT IN CIRCUIT SWITCHED NETWORKS
VOICE TRANSPORT IN PACKET SWITCHED NETWORKS
CHALLENGES OF PACKETIZED VOICE TRANSPORT
VOICE PACKET SIZE
VOICE AND DATA PACKETS
PRIORITY AT NETWORK ACCESS
QOS IN PACKETIZED VOICE TRANSPORT
QOS - DELAY
DELAY FACTORS
JITTER
PACKET LOSS
ECHO
VOICE GATEWAY SERVICES
VOICE GATEWAY STANDARDS
VOIP STANDARDS
PACKETIZED VOICE - TRANSPORT TYPES

Module XI: LAN/WAN NETWORK MANAGEMENT

NETWORK MANAGEMENT ACTIVITIES
NETWORK MANAGEMENT SOLUTIONS
TRAP PDU
SNMP FIELDS DEFINED
WEB BASED NETWORK MANAGEMENT
DIAGNOSTIC AND TEST EQUIPMENT

Module XII: NETWORKING TRENDS AND FUTURES

ATM INTERNETWORKING
ATM STANDARDS ORGANIZATIONS
ATM LAYERED ARCHITECTURE
ATM ATTRIBUTES
ATM CELLS
ATM TRANSMISSION
ATM EQUIPMENT
VPNs - Its ALL ABOUT CONNECTIVITY
WHAT IS A VPN?
BENEFITS OF VPN"S
VPNs - A GROWING MARKET SEGMENT
VPN TYPES
VPN APPLICATIONS
MPLS BASED VPNs

AN OVERVIEW OF MPLS
MPLS ENABLED NETWORKS
ADVANTAGES OF MPLS
TRANSPORT NETWORKS IN VPNs
VPN ACCESS OPTIONS
LAN TO LAN TUNNELING
TUNNELING PROTOCOLS
TUNNELS
QOS IN VPNS
WIRELESS DATA NETWORKS
EVOLUTION OF WLAN PRODUCTS
WIRELESS LAN STANDARDS

Delivery Method

Instructor led with numerous "Hands-On" demonstrations and exercises.

Equipment Requirements

(This apply's to our hands-on courses only)

BTS always provides equipment to have a very successful Hands-On course. BTS also encourages all attendees to bring their own equipment to the course. This will provide attendees the opportunity to incorporate their own gear into the labs and gain valuable training using their specific equipment.

Course Length

3 Days