

Course Description

This Hands-On course is designed to provide an in depth practical as well as theoretical understanding of ISDN technology through a combination of lecture and hands- on learning experiences.

Throughout this course the lecture material is brought to life and reinforced through hands-on labs utilizing state of the art ISDN products and protocol analysis test equipment. After completion of this intensive training program the student will have the knowledge and practical hands-on experience necessary to successfully design, implement, troubleshoot and maintain ISDN premise equipment and access links.

Students Will Learn

- **Throughput with and without B Channel Data Compression**
- **Single and 'Bonded' B Channel Configurations**
- **PPP Security**
- **Dial On Demand (DOD)**
- **Bandwidth On Demand (BOD) Functions**
- **File Transfer (FTP) over Connected LAN Segments**
- **"Live" Protocol Analysis of Call Control Signaling and SPID Advertisements**
- **And More...**

Target Audience

Anyone requiring an Understanding and Hands-On Experience of ISDN technologies.

Prerequisites

Basic Telecommunications.

Course Outline

Module I Introduction

- A. Traditional Networking Review
- B. Today's Needs
- C. Quiz

ModuleII ISDN Concepts

- A. Service Concepts Common Channel Signaling
- B. BRI Access Mechanisms
- C. PRI Access Mechanisms
- D. PRI Channelization
- E. 'Custom ISDN' F. National ISDN
- G. Quiz

Module III Physical Layer Overview

- A. ISDN Reference Configuration
- B. Reference Point and Component Comparisons
- C. Quiz

Module IV Primary Rate Characteristics

- A. AMI Line Code
- B. Signal Regeneration
- C. Framing
- D. Extended Super Frame
- E. PRI Alarms
- F. D3 / D4 Framing
- G. Pulse Density
- H. HDLC Inversion
- I. CSU Overview
- J. Signaling Schemes
- K. Quiz

Module V BRI Characteristics

- A. Bandwidth Allocation
- B. S / T interface Overview
- C. ASI Line Code
- D. S / T Interface Framing
- E. S / T Interface Management Channels
- F. Loopback Locations
- G. Loop Code Definitions
- H. Additional Loopbacks
- I. S / T Interface Activation Signals
- J. S / T Interface Activation Procedures
- K. Maintenance Activation
- L. S / T Frame Alignment Procedures

- M. S / T Media Access
- N. S / T Collision Detection
- O. S / T Associated Wiring
- P. Power Feeding
- Q. U Interface Summary
- R. 2B1Q Line Code
- S. 2B1Q Frame Structure
- T. Embedded Operations Channel Bits
- U. Worst Case Access
- V. EOC Messages
- W. Quiz

Module VI Terminal Initialization and Frame Level Procedures LAPD

- A. OSI Model Overview
- B. HDLC Functions
- C. HDLC Class Definitions
- D. SPIDs - Service profile identifiers
- E. SAPs - Service Access Point Identifiers
- F. Terminal Endpoint Identifiers
- G. LAPD Frame Structure
- H. LAPD Address Field
- I. LAPD Control Field
- J. Frame Types
- K. Poll / Final Bit
- L. Field Mapping Conventions
- M. LAPD Timers and Parameters
- N. LAPD User to Network "Handshake" Exercises
- O. LAPD Frame Reject
- P. Quiz

Module VII ISDN Layer 3 Protocol - Q.931

- A. Layer 3 Protocol
- B. Message Structure
- C. Q.931 Header and Protocol Discriminator
- D. Call Reference Value and Flag
- E. Message Types
- F. Message Associated User - User Information (MA - UII)
- G. Call Associated Temporary Signaling Connections (CA - TSC)
- H. Non Call Associated Temporary Signaling Conns (NCA - TSC)
- Information Element Field
- I. Codeset 0
- J. Codeset 6
- K. Overlaid Channel Provisioning
- L. Call by Call Provisioning (CBC)
- M. Channel Hunt Scheme
- N. Channel Negotiation
- O. Quiz

Module VIII ISDN Numbering - E.163 / E.164

- A. Definitions
- B. World Zones
- C. Field Descriptions Time Table
- D. Related Recommendations
- E. Quiz

Module IX Packet Mode Access

- A. Circuit Switched Access to an Access Unit (AU)
- B. Permanent Packet Mode Transport Services
- C. On Demand Packet Transport Services
- D. TE 1 Example
- E. TE 2 Example
- F. X.121 Numbering Plan
- G. X.121 Test Numbers (sample)
- H. Type of Address / Number Plan Info. (TOA / NPI)
- I. Quiz

Module X. Rate Adaption

- A. Explanation
- B. BONDing and MLPPP
- C. MLPPP+ and BACP
- D. DMI Rate Adaption Types
- E. Formats for DMI Modes 0 and 1
- F. DMI Mode 2
- G. Mode 2 Handshake Messages
- H. DMI Mode 3
- I. V.110 Rate Adaption
- J. Intermediate Rate Framing Convention
- K. E Bit Use for V.110
- L. Bearer Channel Intermediate Rate Identification
- M. V.110 Example
- N. V.120 Rate Adaption
- O. V.120 Frame Structure
- P. Logical Link Identifier (LLI)
- Q. Control Field Description
- R. Example of V.120 Setup
- S. V.120 Header and Control State Octets
- T. Quiz

Notes

Annexes & Hand-Outs

- A. Annex A Codeset 0 (PRI)
- B. Annex B Codeset 6 (PRI)
- C. Annex C ISDN Compass (Comprehensive BRI decoder)
- D. National ISDN Users Forum Applications Cookbook
- E. ISDN Ordering Codes
- F. ISDN EZ Codes
- G. Selected sites and topics of interest from the World Wide Web
- H. BRI D Channel analysis software and data traces!!!

Delivery Method

Hands-On Instructor-Led

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