Hands-On

Data In The Loop-Analog DS0

Course Description

This Hands-On course is designed to give the student a working knowledge of data circuits with a focus on the local loop aspects of these circuits.

The material covers basic telephony as it is applied in the local loop and how that technology is being used and expanded to create a ubiquitous loop environment. The course conferee will learn how the existing imbedded copper plant, re-enforced with loop electronics is able to provide any type of service from simple POTS to the new and sophisticated PANS.

-POTS - Plain Old Telephone Service

-PANS - Pretty Amazin New Stuff

This course is designed around the concept of basic telephony and its application in the local loop. It uses a building block approach, where each module builds on the previous one. Lecture material is re-enforced with stimulating case studies and Hands-On lab assignments. During the lab assignments, students build and test operational data circuits.

Whenever possible, the circuits will use the same hardware used in the students work environment and will be tested using similar test equipment currently in use in the field.

Students Will Learn

- **Telephony**
- **Data Concepts**
- **Voice Grade Data**
- **T-Carrier Overview**
- **Timing & Synchronization**
- **Digital Data Services**
- **Fractional T1 (FT1)**
- **Adtrans 2-Wire Total Reach DDS**
- **Building Data Circuits**
- **Testing & Troubleshooting**
- **Miscellaneous Reference Material and Hand-Outs**
- **And More...**

Target Audience

CPE, Network and Field technicians that are responsible for installation and maintenance, also highly recommended for Managers, Design and Facility engineers and anyone requiring this knowledge.

Prerequisites

None.

Course Outline

Module I: Telephony

Telephone Network Basics
Cable characteristics (NL/H88)
Brief Overview of ISDN (BRI/PRI), ADSL/RADSL, HDSL/2/4, SDSL, VDSL
Levels (dB), Impedance, Equalization, Noise
Hands-on Exercises

Module II: Data Concepts

ASCII Basics
DCE/DTE Characteristics & DSTs
RS-232 (EIA-232), V.35 Connectors & RJ45
Balanced/Un-Balanced Interfaces,
Full/Half Duplex
Point-to-Point and Multi-Point Circuits
Hands-on Exercises

Module III: Voice Grade Data

Modem Characteristics, FSK, QPSK, 8-Phase & QAM
BAUD vs. Bit Rate
Analog Impairments
Analog Data Levels (DLP & TLP)
Passive (Z-Mismatching) and Active Equalization (HT, SL & BW)
Noise (Background & Impulse) Measurements
Noise Filters

Analog Loopbacks
Sealing Current
Hands-on Exercises

Module VI: T-Carrier Overview

A - to - D Conversion
Framing Pattern, Line Codes,
Channel Banks & DCS
Channel Units (Analog & Digital)
2-Wire and 4-Wire Channel Units
Levels (Analog & Digital)
Carrier Levels
Copper T1 Spanlines & HDSL/HDSL2/HDSL4
Hands-on Exercises

Module V: Timing & Synchronization

Asynchronous Timing
Synchronous Timing
BITS Clocks and Slave Clocks
Stratum 1 to 4 Clock Characteristics
Timing Options
Composite Clocking / Integrated / Bit & Byte
Clock Cabling and Terminations (Options)
LORAN-C & GPS Receivers
Plesiochronous Clocking
Wander & Jitter (UI)
Hands-on Exercises

Module VI: Digital Data Services & Fractional T1

DDS Overview
Subrates (2.4kb/s to 38.4kb/s)
56/64kb/s Rates & Fractional T1 (FT1)
Secondary Channels (SC Option)
Error Correction, ZCS/JB7
CSU/DSUs, Data Station Terminations (DDSTs)
OCU-DPs, DS0-DPs, DSU-DPs & DDS-OCUs
QMJUs, MJUs & SRMUs
Digital Data Banks (DDB)
DS0-A and DS0-B Characteristics
Control Codes

DDS Test Sets (DS0 & DS1)
Loopbacks (Alternating & Latching)
Test Patterns
Local Loop Requirements
Hands-on Exercises

Module VII: Adtrans 2-Wire Total Reach DDS

Total Reach Basics
13.3 kHz @ 135? 2-Wire Cable Characteristics
TROCU-DP, TRDDS-R,
Hands-on Exercises

Delivery Method

Instructor-Led with numerous Hands-On Labs 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