DMS-100 System Maintenance and Troubleshooting

Course Description

This extensive Hands-On course provides the skills required to perform maintenance and a high-degree of troubleshooting, and will walk the student through a practical understanding of the Nortel DMS-100 switching system. It discusses the general system architecture used by all Digital Multiplex System switches, with functional block diagrams of the switch and its main modules, including the SN/XA, CCS, IOD, and the various PM and LCM types, plus remotes like the RSU, RCU, and GR-303 RDT. Use and cabling of the MAP and RTIF terminals is explained, plus remote access through serial TTY. Alarm interpretation from the MAPCI is demonstrated, and how to interrogate alarms further, so the student can locate cards within the system. Log messages are used to look- up alarm descriptions, and form the basis for troubleshooting action. The Helmsman documentation viewer and NTPs are also covered in detail, with an emphasis on documents used for maintenance and troubleshooting procedures.

Previous troubles are reviewed and used as exercises, including LNS line and TRKS trunk maintenance, but also parts of the SuperNode/ XA-Core front-end (SN) including the Computing Module (CM), Network (NET), Message Switch (MS), and CCS modules. Peripheral Modules (PM), and modules of particular interest to the students are emphasized. IOD maintenance is also discussed, including procedures to backup Program and Data stores, and a discussion of how hard disks, tape, and BMC devices are connected to the system.

Our non-intrusive exercises equip the student to conduct day-to-day maintenance activities, perform troubleshooting procedures, including cabling and parts of the backplane, and much more. The course is flexible, allowing the most important content for a particular group of students to be emphasized and much more.

Students Will Learn

- **Switching Fundamentals**
- **DMS-100 Theory of Operation**
- **Terminal Access - MAP & RTIF**
- **The primary bays and modules used in the DMS-100 switching system, including different types of remotes, SS7 connections, and key system features**
- **How to use the MAP Command Interpreter with Level and OVLY commands**
- **Various types of documentation including the Helmsman document viewer, NTPs, and installation drawings**
- **How to find the physical location of a fault**

- **How to change packs in various bays**
- **How to query directory numbers, trunk groups, and other database**
- **Basic service order processing**
- **Where to find Emergency Action Procedures documentation**
- **And much more...**

Target Audience

Technical staff such as Central Office Technicians, NOC/SCC, certain management personnel, and who are responsible for the maintenance and troubleshooting of Central Office systems, plus NOC personnel who respond to alarms. No previous switching background is required, although some familiarity with CO equipment will be beneficial. Certain management and provisioning personnel will also benefit, providing a greater understanding of the resources needed for the system, and how to program it.

Prerequisites

A basic understanding of telecommunications and switching principles is helpful due to the accelerated nature of the course. Our BTS Telephony for TeleCom Techs or our TDM Switching Fundamentals Course is available for students with little or no previous telecom background.

Course Outline

Module 1: Switching Fundamentals
- T&R, E&M, 2/4/8 Wire
- Negative Battery
- AC & DC Superposition
- Decibels
  logarithmic scale
  copper & optical measurements
- Digital: A/D & D/A Conversion
  Nyquist Theorem
  Multiplexing Samples
  PCM bit depth - 8 bit, 10 bit
- Time Division Multiplexing (TDM)
  Pulse Code Modulation (PCM)
  DS0/1/3
  DS-30, DS-60, DS-512
  E1, PCM30
  SR128, SR256
  Line Coding
  AC & DC Signals
- Transport: AMI, B8ZS, OC-x, STS-x
- Binary & Hexadecimal overview

- The PSTN

Module 2: DMS-100 Theory of Operation
- Time-Space-Time
- PCM Tx & Rx
- DMS-100 Topology
- Switch Capabilities
- Functional Block Diagram
- Time Stage/PM
- Space Stage/Network incl. 16K, 64K, 128K XPT
- Hardware Modules:
  SuperNode incl. ENI, CM/SLM, MS, LIS (XA-Core, JNET as reqd) IOE: IOD, MAP, RTIF, DDU
LPP: CCS, LIU
  PM: Types I, II, & III (LTC, DTC, SMU, NIU, etc.)
  DS-30/512 Links
  Aux PM: LCM/LCME (various types), LCA, Drawers, ISDN
  SPM, OC-3
  TME, MTM, TMx, etc.
  GPP, GR-303
  Remotes - RSU, RLCM, RCU, DMS-1U, ESA Option, etc.
  SE - other Service Equipment, Ringing, DSX, Terminal Server, etc.
- End-to-End Call
- SS7 Overview

Module 3: Terminal Access - MAP & RTIF

- Maintenance and Administrative Position (MAP)
- Login ($$, Break, ?), Logout
- Command Interpreter (CI) Command Types
  CI (Non-Menu) Commands
  Menu Commands
  MAP Layout - prompt, CM, MS, IOD, Net, PM, CCS, Trks, Ext, Appl
- Basic Command Structure
- Remote Terminal Interface (RTIF)
  A1 Indicator
  CM cabling
- Telnet - EIU & Term-server
- NTP 297-1001-129 - Input/Output System

Module 4: Commands

- Sample CI Commands
  SYS (Non-Menu) Commands: msg, restart, permit, etc. Logutil
  Tables
- Sample MAPCI Commands
  Menus vs. CLI
  MTC, other choices, entering 0
  Lns, Trks sub-menus
  CM, MS, IOD, Net, PM sub-menus
- Examples:
  MTC Status, Query, BSY/TST/RTS, etc.

help, q/Quit, Abort
- 297-1001-822 Commands Reference Manual
- Exercises

Module 5: Documentation

- Helmsman v4.x - install & use
- CD-ROM, Server, Virtual Machine
- Nortel Technical Publications (NTP) - 297 Series
  297-1001-120 - Equipment Identification
  297-8991-805 - Hardware Description
  297-2651-546 - Routine Maintenance
  297-8021-543 - Alarm Clearing and Performance Monitoring
  297-8021-544 - Trouble Locating and Clearing
  297-8021-547 - Card Replacement
  297-8021-545 - Recovery Procedures
  PLN-5001-001i - Technical Specification
  TAM - Technical Assistance Manual (incl. TAM-1001-018)
- Job Site Documentation (J, IS, SD, etc.)
- Examples

Module 6: Maintenance

- Query, QDN, QLEN, QGRP, SRSTATUS
- Lines: LNSTRBL, LISTALM
  mapci;mtc;lns
  LTP, ALT
  LCE, LCM - diagrams, locating exercises
- Trunks: TRKSTRBL, DispGRP, STAT
  mapci;mtc;trks
  TTP, ATT
  tables
- PM: Series I, II, & III
  mapci;mtc;pm
  MTMTM
  MTM DRAM
  DTC, LTC
  SPM
  LPP - LIM, NIU, EIU, LIU7 (CCS7)
  Exercises
- Locating Cards
  CKTINFO, LOCATE
  q listdev
- Replacing Cards:
  Correct Module Extraction & Insertion
  POST command
  post dtc, post spm, post trks, post pm, post carrier
  CLRALM
- System Images
  Data Store (1X55 DDU) & Program Store (9X44 SLM)
  Autodump

Manual dump
Reformat & Dump example
- Routine Exercises (REx)
rextest, queryrex
- Reports & Audits
tables
PRSM
DBAUDIT, SPERFORM, etc.
- Examples

Module 7: Troubleshooting

- NOC/SCC Interaction
- ESD Precautions
- Logutil
Verifying Log, listlogs
list all, dumplog
Examples
- Recovery Documentation
Alarm Clearing, Trouble Locating, & Recovery Procedures
PM DTC Major Alarm Example
- Examples:
IOD:1X55 DDU
MTM: 2X96 PLM
CM: 9X26 RTIF
Student Examples
- RTIF Recoveries:
NTP 297-8021-545
Restart Theory, SWACT, JAM, OVERRIDE, BOOT
Restart - Warm, Cold

Module 8:Translations Introduction (Optional Content)

- Lines/DNs
ADO, CHF, CHG, CLN, NEW, RES, SUS, etc.
- Trunks
Trunking Call Flow & Table Functions
Table CLLI, TRKGRP, TRKSGRP, TRKMEM, etc.
MAP: Trunk Turn-Up
- Tracing
TRAVER, REVXLVER, CNAMDVER, E800VE

Notes

This course can also be delivered in a 5-8-10 day formats, depending on the amount of labs and specific topics covered.

The course is designed to run in a classroom setting, but additional length is added upon request to provide a greater understanding of foundational topics, such as telecom network/stored-program control background, PCM theory,

hexadecimal-binarydecimal conversion, and the many tracing functions available in the DMS-100. More complex troubleshooting concepts can be introduced with this course including various debug logs, inter-bay cabling, and backplane fault analysis (i.e. to help provide a tier-2 expert level of support) for students who need additional skills. Field trips to actual premises are used to allow students an opportunity to see and understand where all the parts of the system are found, what they do, and provide a better end-to-end understanding of the switch.

This course can be combined with other courses like the DMS-100 Support Course and DMS-100 Translations Course for a customized curriculum.

Delivery Method

Instructor-led with a flexible approach that adjusts content most relevant to students. Includes various non-intrusive labs, demonstrations, and exercises to help students focus on and retain the material presented.

Equipment Requirements

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

Access or remote access to a DMS100 Switch is required for this training.

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

5 Days