Hands-On
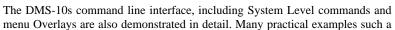# DMS-10 System Maintenance and Troubleshooting

Course Description

This Hands-On course will provide the skills necessary to perform day-to-day maintenance, plus show how to troubleshoot service-affecting faults along with non-intrusive exercises to equip the students to conduct maintenance activities and perform troubleshooting procedures. Students will also cover various types of documentation , which will help greatly when working with the switch.

Widely recognized as the worlds first all-digital switching system, the Nortel DMS-10 is one of the most popular digital switches ever produced, and still remains in widespread use today.

The DMS-10 Switch Maintenance and Troubleshooting course presents a detailed description of the system, and provides the skills necessary to maintain and troubleshoot the switch and its related peripherals. General system architecture is discussed, with diagrams showing functional blocks, card level call processing, and all main modules including the NT3T98 CPU, clock, disk, TTY, and various peripherals connected to the DSDI and I/O bus extender interfaces. The switching Network is also discussed in detail, describing DS-30 PELP links, and the various types of line and trunk peripherals they connect. Specific peripherals for a given system can be emphasized as needed, such PE, CE, LCE, DTC, etc. Miscellaneous Equipment is also discussed, including connections to CCS7, announcement systems, etc.

The DMS-10s command line interface, including System Level commands and menu Overlays are also demonstrated in detail. Many practical examples such a MO system images, line testing, trunk testing, and alarm interrogation are shown. Previous core faults are presented as exercises, where the students will determine the needed course of action. Their conclusions are then compared with the answers of what was actually done to correct these previous faults, providing an extremely effective learning method with zero impact to the network. Training may include any topic of particular interest to the student, or to a given region, and may also include optional subjects like translations and external alarming.

Finally, the Helmsman documentation viewer and NTPs (Series 602) are covered in detail, with an emphasis on the documents used for maintenance, alarm clearing and card changing.

Students Will Learn

- **Switching Fundamentals**
- **Theory of Operation - DMS-10 Topology**

- **The primary bays and modules used in a DMS-10 switching system, including the different types of remotes, plus key system features**
- **How to use the Command Interpreter, and the two types of commands**
- **Terminal Access - TTY**
- **Various types of documentation, Helmsman, NTPs, and installation drawings**
- **How to find the physical location of a fault**
- **How to change packs in CE, PE, and LCE bays**
- **How to query directory numbers, trunk groups, and other database**
- **Where to find Emergency Procedures documentation such as for 1BUS operation, SwAct, and SYSLOAD**
- **Translations Introduction (Optional Content)**
- **And much more...**

Target Audience

Technical staff such as Central Office Technicians, NOC/SCC, certain management personnel, and those seeking cross-training, system interoperability, who are responsible for the maintenance and troubleshooting of Central Office systems, plus NOC personnel who respond to alarms, etc. 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 Circuits - Negative Talk Battery
- AC & DC Superposition
- Decibels
   log scale
   copper, optical
- Digital: A/D & D/A Conversion
   Nyquist Theorem
   Multiplexing Samples
   PCM bit depth - 8 bit, 10 bit
   Binary & Hexadecimal overview - Time Division Multiplexing (TDM)
   Pulse Code Modulation (PCM)   Line Coding
   DS0/1/3

DS-30, DS-512
- Transport: AMI, B8ZS, OC-x, STS-x
- Stored Program Control (SPC)
- Time-Space-Time

Module 2: DMS-10 Theory of Operation - DMS-10 Topology
- Functional Block Diagram
- Time Stage/Peripherals
- Space Stage/Network incl. different matrix varieties
- Hardware Modules (400, 500 and 600 series):
  CPU - 3T98, memory options, SDI/terminals
  IOI/GPIO: MO, 8T90 disk drive units, tape
  Network (Classic, CNI), MLI Interface, DS-x/PELP links   Alarm, Ring Monitoring
ME-CCS
  CE/PE Equipment (line, trunk incl. PSHF, DCM, etc.)   LCM/LCME (various types), LCA, Drawers, ISDN
  Remotes - RLCM, OPM, ESA Option, etc.
- End-to-End Call
- SS7 Overview

Module 3: Terminal Access - TTY
- TTY0 & 1, EIO, SMDI
- System Passwords
- Login, Logout
- Resident Commands
  Sample RES Commands - Overlays
  Why Overlays?
  Sample OVLY Types
  Examples
- Basic Command Structure
- Telnet (SHEL), RTOS UNIX shell
- NTP 297-3601-300 - Input/Output System

Module 4: Commands
- Logi, Password, ####, ?, ****, Logo
- Resident (RES) Level: LOGI, DEBG, OVLY, QUE, TIME, MSG, STAT, etc. - OVLY: ALO, CED, CKT, DED, DN, IOD, PED, etc.
- CKT - LIST, STAT, BUSY, RTS, etc.
- CED - CLK, CORE, XTDR, etc.
- Critical, Major, Minor indicators
- NTP 297-3601-903 - Output Message Manual
- Examples

Module 5: Documentation
- Helmsman v4.x
- CD-ROM, Server, Virtual Machine
- Nortel Technical Publications (NTP) - 297 Series (issues may vary)   297-3601-100 - General Description
  297-3601-150 - Equipment Identification
  297-3601-311 - Data Modification Manual
  297-3601-316 - DIP Switch Settings
  297-3601-511 - Maintenance and Test
  297-3601-902 - Pocket Guide
  297-3601-903 - Output Message Manual
- Job Site Documentation
  J - Equipment Assembly

IS - Interconnect Schematic
SD - Schematic Diagram
- Examples

Module 6: Maintenance
- Using the LIST Command: LKOT, FALT, BUSY, etc. - Lines:
 PE (2T0x)
 LCE (6X17)
 HAZ
- Trunks:
 PE (6X30/31/32)
 CE (6X50)
- Locating Cards:
 QUE
 Examples
- Replacing Line Pack: 6X17
- Replacing Ring Card: 3T59 vs. 6X30
- Test:
 PE (2T14, 2T19, 2T72)
 RA (2T85)
 OVLY TLT: Line Testing, LIT
- System Images: DUMP MO
- (Optional) Basic Translations:
 OVLY CPK
 NEW LPK (DEL)
 OVLYDN
 NEW STN (DEL, CHG, QUE)
 OVLY ROUT
- (Optional) OVLY ALRM & Alarm Points - Exercises

Module 7: Troubleshooting
- NOC/SCC Interaction
- ESD Precautions
- Examples:
 TTY0 Connectivity, DSDI
 MO0 Card Change, Format   HD Card Change, BKUP
- Alarm Investigation: LIST ALM
 ALPK
 LIST ALL
 STAT
- CLK: STAT SYNC
- OVLY SHEL
 ARP, Ping, TELN
- Emergency Procedures (EP):   Cold Start Example
- Student Examples

Module 8: Translations Introduction (Optional Content)
-Lines/DNs
Service Order Commands (ACT, ADO, DEL, DLO, MOV, NEW, etc.) Create a Line Pack
-Trunks OVLYTG
OVLY TRK, QUE TRK
-Tracing
Translation Tools and Tables OVLY CLI
OVLY TRAC
TRVR, OVLY QTRN

OVLY SND

Notes

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

Note The course is designed to run for 5 full days in a classroom setting, but additional length is added upon request to provide a greater understanding of foundational topics, such as telecom networks, PCM theory, or hexadecimal-binary-decimal conversion. More complex troubleshooting concepts can be pulled into this course including debug logs, inter-bay cabling, and backplane (i.e. to provide a tier-2 level of support). Field trips to actual premises can be 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 such as the DMS-10 Support Course for a customized curriculum.

Delivery Method

Instructor-led with a flexible approach that adjusts content to that which is most relevant to students.
It 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 DMS10 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