

Hands-On

# 5ESS Operations Field and Control Center

(NOC, NRC, SCC, CCC, etc.)



## Course Description

This Hands-On 5ESS Operations for Field and Control Center (NOC, NRC, SCC, CCC, etc.) course begins with a general overview of the 5ESS Switch with emphasis placed on the Modules and Unit functions. Next, the Central Office Power configuration and Power Alarm arrangements through the 5ESS display screens are explained. This is followed with a lesson presenting the function and operation of the Administrative Module, its Units, related display screens and commands. The function and operation of the Communication Module 2 (CM2), Communication Module 3 (CM3) and Quad Link Packet Switch Network (QLPS) are presented next.

This includes the QLPS, CM2, CM3, display screens and related commands. The Switching Module Processor lesson presents the function and operation of the MCTU, MCTU2, MCTU3, SMPU4 TSIU4, SMPU5 TSIU4-2 and SMU6 along with their display screens and commands.

The next lesson, Switching Module Peripheral Units, presents function and operation of all the different Peripheral Units that can reside in a Switching Module. This lesson also includes related display screens and commands. The Signaling System 7 lesson is presented next and addresses both the IRN2 and PSU-SS7 versions along with related display screens and commands. The next lesson presents Software Update display screens and procedures as defined in Alcatel-Lucent's Routine Operations and Maintenance Procedures document, 235-105-110.

The last lesson presents Call Processing through the 5ESS and Related Recent Change Views. Alcatel-Lucent's 5ESS Dyna Text Switch documentation is referenced throughout this course. This course can be customized to include Control Center (SCC/NOC/NRC etc.) Operational Support System (OSS NMA, TNM, Netcool, etc.) messages.

The objective of 5ESS Operations is to train maintenance personnel to effectively maintain a 5ESS and care for alarms, abnormal conditions and service affecting situations. After completing this course, you will be able to

- 5ESS Overview
- 5ESS Power, Power Procedures, Alarms and 5ESS Equip.Diagnostics
- Administrative Module Functions, Circuitry and Terminations
- Communication Module 2 & 3 Functions, Circuitry and Terminations
- Switching Module Processors Functions, Circuitry and Terminations
- Switching Module Peripheral Unit Functions, Circuitry and Terminations
- Common Network Interface and Packet Switch Unit System Signaling 7 Functions, Circuitry and Terminations
- Software Update / Broadcast Warning Messages (SU/BWM) basic information
- Origination Call Processing through the 5ESS Equipment and RCVs
- Line Unit (LU) 1, 2 and 3
- Access Interface Unit (AIU, EAIU and XAIU)
- Integrated Services Line Unit (ISLU 1 & 2)



- Packet Switch Unit (PSU & PSU2)
- Integrated Digital Carrier Unit (IDCU)
- Digital Carrier Line Unit (DCLU)
- Digital Line Trunk Unit (DLTU and DLTU2)
- Trunk Unit (TU)
- Digital Network Unit SONET (DNU-S)
- Optical Interface Unit (OIU)
- Digital Service Units (1, 2 & 3) LDSU & GDSU
- And Others

## Students Will Learn

- **State the function of the 5ESS Modules**
- **Identify Power Alarms and state a course of action to care for the alarm**
- **Identify the Units in the Administrative Module and their related Display Screens**
- **Identify the Units in the Communication Module and their related Display Screens**
- **Describe the function of the Quad Link Packet Switch (QLPS), Quad Link Packet Switch Gate Way Processor (QGP) and their related Display Screens**
- **Differentiate between the different Switching Module Processors**
- **Relate Switching Module Peripheral Units to their Display Screens**
- **Describe methods to initiate a Diagnostic and Restoral of a Switching Module Peripheral Unit**
- **Describe what the different IRN2 Signaling System 7 Display Screens represent**
- **Describe what the different PSU Signaling System 7 Display Screens represent**
- **State where the documented steps for recovering the AM, CM and SMP reside**
- **Describe the basic 5ESS Call Processing steps**
- **Analyze Diagnostic Phases in Alcatel-Lucent's Corrective Maintenance Procedures document, 235- 105-220**
- **And More...**

## Prerequisites

5ESS Operations is an entry level to midlevel course addressing the 5ESS Switch equipment, modules, units and circuits. Because of the technical level of this course, students should have the following prerequisites

Recognize the existence of the 5ESS Switches Modules and Units

- Administrative Module (AM),
- Communications Module (CM),
- Switching Module Processor (SMP) Module Controller and Time Slot Interchanger (MCTSI)
- Switching Module Peripheral Units, such as Line Unit, Access Interface Unit, Integrated Services Line Unit, Digital Line Trunk Unit, Digital Service Unit, etc.

Be aware of 5ESS Switch internal connectivity and connections

- Network Control and Timing (NCT/NCT2) Links and Time Multiplexed Switch (TMS) Links,
- Peripheral Control and Timing (PCT) Links,
- Peripheral Interface Data Bus (PIDB)
- Peripheral Interface Control Bus (PICB)

Familiar with using Alcatel-Lucent's Input Manual (235-600-700) to develop input messages  
Familiar with using Alcatel-Lucent's Output Messages Manual (235-600-750) to decipher output messages  
Ability to reference Alcatel-Lucent's 5ESS Dyna Text Switch documentation.

## Course Outline

### Lesson 1 5ESS Switch Overview

This lesson presents a brief overview of the 5ESS Switch. This overview presents the hardware structure of the 5ESS Switch which includes defining the Administrative Module, Communication Module and Switching Module. It also states the function of the 5ESS Switching Module Peripheral Units and presents their connectivity to the Switching Module Processor and Time Slot Interchanger. This establishes some of the basic knowledge needed for the remainder of this course. This lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates topics in the lesson to the documentation.

### Lesson 2 Central Office and 5ESS Power

This lesson, Central Office Power and Alarms, addresses the different electrical power sources and configurations that support telephone Switching Systems and Central Offices. The lesson begins with a Central Office power overview. Next, it presents the telecommunications power room and its functions. This is followed with emergency power and critical power situations that can occur and how they would affect the 5ESS Switch. The lesson looks at the 5ESS Power Converters and Power Control and Display circuits next. The last part of the lesson presents the 5ESS power alarms and stresses their impact on the 5ESS Switch. This includes a discussion of the 105 Building Power and Alarm Controls display page along with Alcatel-Lucent's Corrective Maintenance Procedures manual (235-105-220) power procedures.

### Lesson 3 Administrative Module Functions, Circuitry and Terminations

This lesson presents the Administrative Module at the functional, circuit pack and connector level. The emphasis is placed on the functions of the AM circuit packs, connector terminations and diagnostic procedures. This lesson presents the Administrative Module Control Unit (CU), Disk File Controller (DFC), Input Output Processors (IOP), Peripheral Controllers (PC) and Port Switch and Scanner-Distributor Buffer (PSSDB). The connector terminations presented include the Dual Serial Channel, Main Store Update Bus and Maintenance Channel. The lesson presents associated maintenance display pages and references Alcatel-Lucent's Dyna Text 5ESS support documentation.

### Lesson 4 Communication Module 2 and 3 Functions, Circuitry and Terminations

This lesson presents the Communication Module (CM2 and CM 3) at the Unit, circuit pack and connector termination level. The CM2 is initially presented and begins by describing the functions of the Communication Module. This is followed with a presentation of the Time Multiplexed Switch (TMS) and its Network Control and Timing (NCT) and Network Control and Timing 2 (NCT2) link terminations. A functional description of the flow of a data time slot through the TMS is also presented. This is followed with a presentation of the Message Switch (MSG) including the flow of a Control Time Slot (CTS) through the MSG. The lesson also presents the Quad Link Packet Switch (QLPS) Network and the Quad Link Packet Switch Gateway Processor (QGP). This also includes the flow of a Quad Link Packet. The CM3 functionality and circuitry is presented next. The lesson references Alcatel-Lucent's Dyna Text 5ESS support documentation.

### Lesson 5 Switching Module Processors Functions, Circuitry and Terminations

The Switching Module Processor (SMP) lesson presents the Modular Controller and Time Slot Interchange Unit Model 2 (MCTU2), Modular Controller and Time Slot Interchanger Model 3 (MCTSI 3), SM 2000 (TSIU 4 and SMPU4) and SM-

2005 (TSIU 4-2 and SMPU5). The lesson presents SMP functions, circuit packs and connection terminations. The connection terminations include Network Control and Timing (NCT and NCT2) Links, Peripheral Interface Data Bus (PIDB), Peripheral Interface Control Bus (PICB) and Peripheral Control and Timing (PCT) connections. Associated 5ESS Display Pages and diagnostic procedures are also presented. The lesson references Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates lesson material to the documentation.

### **Lesson 6 Switching Module Peripheral Units Functions, Circuitry and Terminations**

This lesson presents the different 5ESS Peripheral Units to the function and circuit pack level. The lesson includes associated 5ESS Display Pages and selected diagnostic procedures. The peripheral units presented are:

#### Line Units

Line Unit Models 1, 2 & 3 LU 1, 2 and 3  
Access Interface Unit AIU, EAIU and XAIU  
Integrated Services Line Unit ISLU and ISLU2  
Packet Switch Unit Model 1 and 2 PSU and PSU2  
Digital Carrier Line Unit DCLU  
Integrated Digital Carrier Unit IDCU

#### Trunks

Trunk Unit TU  
Digital Line Trunk Unit Model 1 and 2 DLTU and DLTU 2 (DS1)  
Digital Network Unit SONET DNU-S (STS1)  
Optical Interface Unit OIU (OC3)  
Packet Switch Unit Model 1 and 2 PSU and PSU2

#### Service and Test Units

Local Digital Service Unit LDSU  
Local Digital Service Function LDSF  
Global Digital Service Unit GDSU  
Global Digital Service Function GDSF  
Recorded Announcement Facility RAF  
Service Announcement System SAS  
Integrated Services Test Function ISTF  
Modular Metallic Service Unit MSU and MMSU  
Directly Connected Test Unit - DCTU  
Digital Service Unit Model 1, 2 and 3 DSU 1, DSU 2 and DSU 3

### **Lesson 7 Common Network Interface (CNI) and Packet Switch Unit (PSU) System Signaling 7 (SS7) Functions, Circuitry and Terminations**

This lesson presents the Common Network Interface (CNI) Integrated Ring Node Version 2 (IRN2) and the Packet Switch Unit System Signaling 7 (PSU SS7) application. The lesson initially presents the CNI Ring IRN2 circuitry, functions and connection terminations. This is followed with IRN2 diagnostic information. The lesson completes by presenting the PSU SS7 application that is provided in new 5ESS Switch installations and available as a retrofit. This lesson presents associated maintenance display pages and includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation.

### **Lesson 8 Software Updates**

This lesson presents the 5ESS Switch Software Updates (also known as Broadcast Warning Messages BWMs). The lesson

begins by explaining what a Software Update is and its impact on the 5ESS Switch. It then explains the flow of obtaining the Software Update. This is followed by presenting the 5ESS Switch Software Update Display Screens. The lesson completes by identifying Alcatel-Lucent's documented Software Update procedures. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates procedures in the lesson to the documentation.

### **Lesson 9 Call Processing and Related RCVs**

This lesson presents the physical switching equipment, their functions and related Recent Change Views involved with a call origination. It presents the call origination via a Line Unit model 3, identifies the Per Call Tests performed with an origination including the Line Recent Change Views. Next, the lesson presents dialed digit detection and digit analysis. This identifies the equipment involved with digit detection, call processing functions performed and some basic Recent Change Digit Analysis views. Finally, the lesson presents the routing of the call to the called party. This includes Routing Switching Modules, Line to Line and Line to Trunk calls. This lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates topics in the lesson to the documentation.

### **Notes**

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

### **Delivery Method**

Instructor-led with Hands-On labs and exercises.

### **Equipment Requirements**

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

Access or remote access to a 5ESS Switch and Switch Documentation aka Dynatext 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