

Hands-On

# 5ESS ISDN Provisioning and Maintenance

Primary Rate Interface



## Course Description

This Hands-On ISDN Primary Rate Interface Provisioning and Maintenance course starts with an overview of the 5ESS Switch and Integrated Services Digital Network (ISDN) basics. This brief review includes 5ESS Switch Modules, Peripheral Unit functions and ISDN concepts. This is followed with ISDN Primary Rate Interface (PRI) specifics, such as Physical Hardware Components, ISDN PRI Connections, Custom versus National ISDN PRI, ISDN PRI Services and ISDN PRI Features. The ISDN Primary Rate Interface Provisioning lesson addresses the 5ESS Recent Change Views used to build an ISDN Primary Interface Group, Trunk Group and Trunk Members.

The course also addresses 5ESS hardware, transport facility and channel group provisioning. Next, protocol layers 1 (I.431), 2 (Q.921) and 3 (Q.931) are presented as they pertain to the ISDN Primary Rate Interface. This includes layer 2 connectivity along with layer 3 Information Element definitions. The Call processing lesson presents how Recent Change Views control the origination and termination of calls involving a PRI Trunk Group. The ISDN PRI Automatic Line Evaluation (ALE) and PRI Protocol Monitoring lesson presents Automatic Line Evaluation analysis procedures, input messages to initiate Protocol Monitoring sessions and procedures to analyze ISDN PRI protocol. An ISDN Primary Rate Interface Trunk Maintenance lesson looks at the PRI Trunk Group Members and the trunk member tests available.

Each lesson provides procedures, tables, charts, casework, information on the resolution of 5ESS Switch ISDN PRI service problems and recommendations of What To Do Next. Alcatel-Lucent's 5ESS documentation is used and referenced throughout this course.

The objective of ISDN Primary Rate Interface Provisioning and Maintenance is to train provisioning and maintenance personnel to build / translate, turn-up and maintain ISDN Primary Rate Interface circuits in a 5ESS Switch.

## Students Will Learn

- **State what ISDN Primary Rate Interface service is**
- **Identify the 5ESS Switch Modules and Units required to provide ISDN PRI service**
- **Identify 5ESS Switch Recent Change Views and Fields needed to provision ISDN PRI service**
- **State the ISDN PRI Protocol layers that support ISDN PRI services and their function**
- **State the flow of a call over an ISDN PRI trunk group (Originating and Terminating) based on Recent Change Views**
- **Analyze Automatic Line Evaluation (ALE) output messages**
- **Initiate and interpret the results of a 5ESS ISDN Protocol Monitoring session**
- **Perform ISDN PRI B Channel Trunk Member tests and maintenance**
- **And More...**

## Prerequisites

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This course builds on the knowledge gained from basic and introductory 5ESS Switch courses. Basic knowledge of the physical and functional structure of the 5ESS Modules and Units, such as

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, Digital Line Trunk Unit, Digital Network Unit, Digital Service Unit, etc.

Ability to use 5ESS Switch support documentation, such as

5ESS Switch Dyna Text documentation

5ESS Switch Input Messages Manual

5ESS Switch Output Messages Manual

## Course Outline

### Lesson 1 - 5ESS Switch and ISDN Basics

5ESS Switch and ISDN Basics presents a brief overview of the 5ESS Switch and ISDN functionality. This lesson defines the 5ESS Switch equipment and hardware structure as it relates to ISDN services. This includes the basic 5ESS Switch Modules and the Peripheral Units that support ISDN services, such as the Packet Switch Unit (PSU & PSU2), Digital Line Trunk Unit (DLTU & DLTU2), Digital Network Unit - SONET (DNU-S) and Optical Interface Unit (OIU). The lesson goes on to present ISDN fundamentals such as D channel signaling, B channel voice and data, and Basic Rate Interface versus Primary Rate Interface Integrated Services Digital Network. This lesson establishes the basic knowledge needed for the following lessons. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates procedures in the lesson to the documentation.

### Lesson 2 Overview of ISDN Primary Rate Interface Service

This lesson addresses specifics about the ISDN Primary Rate Interface (PRI). This includes the function of the 5ESS hardware components supporting ISDN PRI including what the hardware provides. This lesson presents the provisioning of the DS1 Transport Facilities. The lesson also presents the flow of the D Channel and B Channel through the 5ESS hardware. From this point the lesson goes on to present Custom ISDN PRI versus National/Standard ISDN PRI and defines their differences. Relating to the lesson content presented to this point, the lesson describes ISDN PRI Services and Features. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates procedures in the lesson to this documentation.

### Lesson 3 Provisioning Primary Rate Interface Service

This lesson, Provisioning ISDN Primary Rate Interface Service, presents the 5ESS Recent Change Views used to establish ISDN Primary Rate Interface (PRI) Service. These Recent Change Views establish the translations supporting the ISDN PRI hardware and software. This includes presenting Integrated Services Circuit Number (ISCN) / Packet Office Equipment (POE) / Digital Subscriber Line Group (DSL) assignments and D Channel PSU TSIU Timeslot assignments (RCV 22.2) for Classic Switching Modules. The lesson also addresses ISDN PRI features such as: None Facility Associated Signaling (NFAS), D Channel Backup (DCHBU), Call By Call (CBC), Two B Channel Transfer (TBCT), 384 Kbps Service, Calling Name Delivery (CND), Billing Telephone Number (BTN) versus Calling Party Number (CPN) and Calling Party Number (CPN) versus Main Directory Number (MAIN DN) options. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates procedures in the lesson to the documentation.

#### Lesson 4 ISDN Primary Rate Interface Protocol

The ISDN Primary Rate Interface Protocol lesson begins by generally defining protocol. This includes presenting the International Standards Organizations (ISO) Open Systems Interconnect (OSI) seven layer model and explaining where the ISDN PRI protocol fits into the model. From this point, the lesson identifies ISDN PRI Layer 1 (I.431), Layer 2 (Q.921, LAPD) and Layer 3 (Q.931) protocol along with their equipment terminations within the 5ESS Switch. The lesson presents the function of each level of protocol, how that level of protocol becomes operational and the Protocol messaging. This includes a detailed explanation of how the D Channel becomes operational. From this point the lesson presents protocol messaging for removing and restoring B Channels, controlling D Channel Backup and performing B Channel Associated Signaling (BCAS). Next, the lesson presents Q.931 call processing messages. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates the protocol messages to the documentation.

#### Lesson 5 ISDN Primary Rate Interface Call Processing and Features

This lesson, ISDN Primary Rate Interface Call Processing and Features, presents Call Flow scenarios over an ISDN PRI, Feature activation and associated Protocol messaging. The lesson includes Recent Change View Fields pertinent to the Call Processing and Feature operations. Several common Call Processing and Feature operation failures are discussed along with the customer's perception of the failure. This lesson establishes the detailed ISDN PRI operational knowledge required for effective maintenance analysis. The lesson includes references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates procedures in the lesson to the documentation.

#### Lesson 6 ISDN Primary Rate Interface Automatic Line Evaluation (ALE) and Protocol Monitoring

This ISDN Primary Rate Interface Automatic Line Evaluation (ALE) and Protocol Monitoring lesson presents the 5ESS Switch error detection and protocol monitoring tools. The lesson begins by presenting the 5ESS Performance Monitoring abilities for detecting errors at the Layer 1 level. This is followed with an explanation, including examples, of the 5ESS Switch's Automatic Line Evaluation error detection process. The lesson relates the ALE errors to the protocol they occurred in. Next, this lesson presents the 5ESS Switch Protocol Monitoring abilities. Protocol Monitoring and testing procedures

are presented for monitoring Layer 2 and Layer 3 protocol levels. During this portion of the lesson several operational problems are identified through protocol analysis and corrective procedures are identified. The protocol messages obtained here can also be obtained through stand alone protocol monitoring test equipment. This lesson references to Alcatel-Lucent's Dyna Text 5ESS Switch support documentation and relates ALE and protocol messages to the documentation.

## **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