

# Understanding SONET & Optical Networks



## Course Description

During this powerful 2-day course, SONET technology fundamentals are examined in detail to create a solid technical foundation and understanding of these complex Technologies. The participants are led through applications, framing, protection switching and other key elements of the SONET architecture.

SONET and SDH are the global standards for optical telecommunications transport they define the transport infrastructure for telecommunications networks worldwide.

## Students Will Learn

- SONET Architecture
- SONET Signal
- SONET Network Components and their Functions.
- Examine Overhead Structures and their use in Testing and Management.
- SONET Sub-Rates, Super-Rates, Concatenation and Virtual Tributaries and Group Mapping
- Clarify SONET Applications and Ring Architectures
- Automatic Protection Switching, Performance Monitoring and Error Reporting as well as System Alarms are examined in detail.
- Exploring WDM and DWDM
- Current trends in the implementation of SONET & Optical Networks.
- And More
- This knowledge is essential for the persons responsible or interested in Performance Monitoring, Network Design, Installation and Troubleshooting
- of Optical Technology Networks.

## Target Audience

Anyone requiring an understanding of SONET, SDH and Optical Networks. Outside Plant / Field, Installation and Maintenance, Central Office, Testing and Troubleshooting, Special Service, Circuit Provisioning, Software Engineers and anyone responsible or Interested in Designing or Implementing SONET, SDH and Optical Networks.

## Prerequisites

None. A basic understanding of telecommunications transmission principles will be useful for students taking this course. This information can be obtained in our

TeleCom Today "I" or "II"  
Hands-On Basic Telephony & TeleCom Electronics  
Hands-On Internetworking Essentials

## Course Outline

### Module I. OVERVIEW OF SONET

Digital Rates Compared  
Multiplexed Transmission systems  
A Global Network  
Advantages of SONET  
SONET Defined

### Module II. SONET SIGNAL FUNDAMENTALS

Framing Structure  
Signal Hierarchy  
Multiplexed Rates  
The Basic STS-1  
Sub-Rate Signals

### Module III. SONET LAYERS AND COMPONENTS AND OVERHEAD

Path Terminating Equipment  
Line Terminating Equipment  
Section Terminating Equipment  
Section Overhead - Error Checking & Synchronization  
Line Overhead - Pointers & Protection Switching  
Path Overhead - Payload Management  
Concatenation

#### **Module IV. SONET SUPER RATES, SUB-RATES & SDH**

SDH Hierarchy & Framing  
Virtual Tributaries  
Converting the Asynchronous Signal to SONET  
VT Types, Capacities and Group Mapping

#### **Module V. SONET PROTECTION SWITCHING**

Linear versus Ring  
Path & Line  
Two Fiber versus Four Fiber  
Automatic Protection Switching  
APS Initiation, Commands, Criteria, & Priorities  
APS Switch Activation Bytes - K1 & K2

#### **Module VI. SONET RINGS & APPLICATIONS**

SONET Ring Inter-working  
Local Access Rings and Network Backbones  
SONET Ring Types & Applications  
SONET Ring Objectives

#### **Module VII. SONET PERFORMANCE MONITORING & TESTING**

Monitoring SONET Signals  
Fault Isolation and Sectionalization  
Performance Data Collection and Reporting  
Functions Supported at the OS/NE Interface  
Network Access Test Points  
Failure States, Signal Alarms and RDI\\s

#### **Module VIII. DWDM FUNDAMENTALS**

WDM & DWDM Overview  
Evolving DWDM  
DWDM Applications and Deployment

#### **Module IX. SONET APPLICATIONS - AN UPDATE**

Optical Switching and Technologies

Cross-Connection by Wavelength  
Local Access Rings  
SONET in the Local Loop (SDSL)  
Data Over SONET - Data Over Fiber  
Fiber Advances and Future Developments

## **Module IX. APPENDIX**

SONET Reference Documentation  
- SONET OAM&P references  
- SDH/SONET OAM&P references  
- Bellcore/Tellabs documents  
- SDH general references  
- SDH OAM&P references  
- WDM / DWDM references

## **Delivery Method**

Instructor led with numerous 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**

2 Days