

# Telecommunications Site Installation & Commissioning

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## Course Length

Four Days

## Prerequisites

A fundamental understanding of telecommunications transmission principles will be useful for students taking this course. *This course can be customized to meet specific system requirements.*

## Course Objectives

This course is for technical and non-technical students who are required by carriers to install and turn-up cellular radio and microwave communication sites. The course covers four important areas required at all radio sites including, radio and antenna fundamentals; installing T1/DS3 circuits; installing and testing antenna systems; RF Site Safety and OSHA regulations.

This class is designed to be approximately 50% hands-on using customer and vendor provided test equipment. Students completing this course will be able to install and test T1/DS3 circuits and commission antennas. This course will also fulfill OSHA requirements for RF Site Safety compliance.

## Suggested Equipment

Students should bring calculators capable of executing LOG functions for student exercises. Test and network equipment should include:

- Antenna availability and test equipment – Sweep & TDR
- Transmission lines or waveguide – good or bad
- RF Spectrum Analyzer
- T1, DS3, SONET Test equipment

Network Equipment should include

- Radio terminals – if available
- RF attenuators for radio terminals – 60dB min.
- T1 Circuits for testing - if available.
- Power Supplies - capable of supporting load
- Plug Strips

For more information contact us at  
(800) 360-1425 [info@dover-ts.com](mailto:info@dover-ts.com)



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## COURSE OUTLINE

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### Introduction to Radio Transmission

- Why Radio
- Radio Vs Fiber Vs Cable
- Bandwidth Defined
- Attenuation and Noise
- Radio Regulation in the US

### T1 Fundamentals

- Building the T1 Frame
  - A/D Conversion
  - T1 Framing -*SE*
  - T1 Signaling - *SE*
- T1 on the Span
  - Line Code -*SE*
  - AMI
  - B8ZS
- End To End Connectivity
- T1 Errors & Alarms - *SE*
- T1 Test Patterns - *SE*
- Testing Overview - *SE*

### DS3 Fundamentals - optional

- Types of DS3 Signals
- M13 Multiplexing - *SE*
- High Speed Cards - interfaces
- DS3 Errors & Alarms - *SE*
- DS3 Test Patterns -*SE*
- DS3 Testing - *SE*

### Radio Antenna Systems

- How Antennas Work
- Antenna Gain, Bandwidth, Beamwidth
- Transmission Lines & Grounding
- Antenna Testing Procedures- *SE*
- Standard Tests
  - Antenna Bandwidth - *SE*
  - Fault Recognition - *SE*
  - Return Loss - *SE*
  - RL vs. VSWR - *SE*
  - Distance to Fault - *SE*

### RF Site Safety and the Law

- OSHA 29CFR 1910 & 1926
- ANSI, FCC, OSHA Standards
- FCC Enforcement
- Federal vs. State Regulations
- Training and Record keeping - *SE*

### Types of Radiation

- Ionizing Radiation Transmitters
- Non-ionizing radiation
- Contact Currents
- Near field vs. Far field
- Wavelength & Radio Spectrum - *SE*

### Maximum Permissible Exposure

- MPE Defined
- Exposure Limit - *SE*
- Controlled vs. Uncontrolled
- The 5% Rule
- Contact Currents

### Hazard Assessment

- Site Assessment - *SE*
- Site Inspection & Security
- Multi-user Sites
- Posting Requirements - *SE*
- Lock out – Tag out
- Personal Protective Equipment
- RF Monitors

*SE* = Student Exercise

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