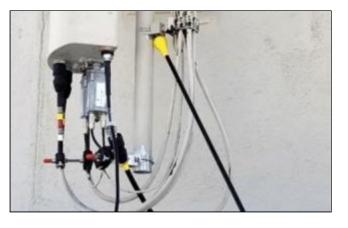
# Hands-On Microwave Radio System Installation



## **Course Description**

This course teaches installation and troubleshooting technicians the key elements needed for installing, testing, validating and troubleshooting microwave links.

The course introduces the elementary principles of radio used in microwave services. It teaches how to survey the location in order to position access points in the appropriate location and how to avoid interference with other services. The course identifies the problems with alignment of antennas and dish systems as well as teaching what appropriate safety precautions need to be taken.



## **Students Will Learn**

- Recognize Different Classes Of Microwave Equipment And Describe Their Uses
- Configure Appropriate Feeder Equipment
- Align And Validate Links
- Calculate Expected Signal Strengths And Measure Service Levels To Confirm
- Troubleshoot Link Problems
- And More...

## **Target Audience**

This course is geared for installation and troubleshooting technicians.

## **Prerequisites**

This course assumes attendees already have basic knowledge of data communications, PCs and IP systems. No prior knowledge of radio or Wireless systems will be assumed

# **Course Outline**

#### Module I: Microwave Link Services

Technologies and Terms What are microwaves? Key microwave bands and their applications Recognizing Microwave Plant Power and Safety issues

Hands-on Exercise: Configuring Ad-hoc Wireless connections

#### Module II: Microwave Radio Principles

Radio Transmission Principles Radio Propagation Signal Power and Free Space Loss Effective Radiated Power (ERP) Polarization Absorption Diffraction Reflection

Signal to Noise Ratio

Cell Based operation

Carrier interference noise

Interference effects and Fading

MiMo and SiSo

Modulation
Amplitude, Frequency and Phase Modulation
QAM
Multi-Access Systems
FDM, TDM, TDMA, FHSS, DSSS, OFDM, CDMA
Frequency use
Overlapping channels
Noise and signal strength
Operating Speed and multi-standard selection
Configuring Access Points

## Module III: Microwave Antenna Systems

Dish antennas

Selecting the appropriate types

Towers and Dish Mountings

Static Mounts

Loading and support

Hands-on Exercise: Site Survey and Fault Isolation

## Module IV: Microwave Test Equipment

Inside antenna systems Outside Antenna Systems Connections

Long Range Connection Systems

WiFi Service requirements Defining the Service requirements Selecting Routers and Access Points Deploying bridges between buildings Routing and Fire-walling Monitoring and managing the service

Hands-on Exercise: Testing Antenna Performance

#### **Evaluation and Review**

## **Delivery Method**

Instructor-Led with numerous case-studies and Hands-On 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