Radio Frequency Technology

2 Days

COURSE DESCRIPTION

This course is designed for telecommunication and IT professionals requiring an understanding of the principles of radio frequency technology and a deeper knowledge of modern radio communication systems.

The course enhances the technical capability that teams need for day-to-day operational work or research programs.

WHO SHOULD ATTEND?

ICT engineers, RF technicians, radio amateurs, military comms personnel, academics, telecommunication regulators, and stakeholders requiring a better knowledge of radio technologies.

COURSE OBJECTIVES

By the end of this course participants will be able to:

- Explain the physics of radio waves, propagation and radio spectrum
- Describe RF technology, terminology, RF components and their characteristics
- Explain RF power, S-parameters, VSWR, transmission and reflection
- Explain antenna theory

SOME COURSE BENEFITS

- Develop an understanding of RF technology
- Operate, maintain and troubleshoot radio communication equipment
- Measure a radio signal and its performance

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FORMAT

2 days, interactive classroom-based or live online via Zoom.

Maximum attendees: 12 per course.

CONTENT

Day 1 Morning

- Radio Frequency – basic understanding
  - The RF unit dB, dBm, dBW – their meanings and how they are used
  - Frequency, wavelength and bandwidth
  - Waveforms (Sine, Square), the conversion from time domain to frequency domain
  - Radio waves – transmission, reflection, propagation and polarization
  - Radio spectrum, HF, VHF, UHF, SHF and their use cases

Day 1 Afternoon

- Radio Parameters
  - Insertion loss and Return Loss
  - RF gain or loss
  - Modulation, noise & distortion, SNR, I/N
- Impedance – basic understanding
- Smith Charts and S-parameters
- RF Measurement

Day 2 Morning

- Antenna
  - Antenna parameters, gain, impedance, directivity, sidelobe etc.
  - Dipole Antenna, radiation pattern
  - Polarization, azimuth and elevation
  - Antenna array, radar antenna
  - Direction finding antenna

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Day 2 Afternoon

- Modulation and Demodulation
  - AM, FM, and digital modulation (QAM, PSK, FSK, MFSK)
  - Frequency Hopping principles
  - RF Transmitter, power amplifier, modulator
  - RF receiver, LNA, mixer, demodulator, Analog to Digital converter
  - Filter and Duplexer
- RF non-linearity
  - Distortion
  - Intermodulation, adjacent channel leakage, blocking
  - Crosstalk
- RF Interference

Assessment (Optional for in-house courses)

- Instructor led interactive quizzes
- Multiple choice written test

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