Overview of OFDM

TRND103d | On-Demand | LTE and VoLTE | Express
Course Duration: 2 hours

Orthogonal Frequency Division Multiplexing (OFDM) is a transmission technique used to achieve very high data rates. OFDM is the technology of choice for all major wireless systems including Wireless LAN – 802.11, WiMAX – 802.16, digital audio/video broadcast systems, and the air interface evolution of 3G Wireless systems based on 3GPP and 3GPP2. OFDM facilitates higher data rates over a wireless medium, which is very exciting to wireless operators who are eager to deploy multimedia rich Internet content over a wireless medium with seamless access anywhere, anytime. This course describes key OFDM concepts and terminology.

Intended Audience

This is a technical course, primarily intended for those in system design, system integration and test, systems engineering, network engineering, operations, and support.

Objectives

After completing this course, the student will be able to:

- Walk through the evolution of radio technologies
- Describe the evolution and applications of OFDM
- List the key attributes of OFDM and understand the frequency domain orthogonality
- Define various terms used in OFDM-based systems
- Describe challenges of radio propagation and how OFDM overcome these challenges
- Describe the key operation of cyclic prefix, FFT and IFFT
- List the basic transmitter and receiver components in an OFDM system
- Step through the operations of an end-to-end data transmission in an OFDM-based system

Course Prerequisites

No Prerequisites

Outline

1. Introduction
1.1 Evolution of radio technologies
1.2 Concepts of FDMA, TDMA, CDMA
1.3 Need for OFDM for high data rates

2. Principles of OFDM
2.1 Key attributes of OFDM
2.2 Frequency domain orthogonality
2.3 Time and frequency domain views

3. OFDM Basics
3.1 Carrier and subcarrier
3.2 Modulation and OFDM symbol
3.3 Subcarrier spacing
3.4 Guard period and cyclic prefix

4. Radio Propagation
4.1 Multipath and doppler shift
4.2 Inter Symbol Interference (ISI)
4.3 Guard Time
4.4 Inter Carrier Interference (ICI)
4.5 Cyclic prefix and pilots

5. Fourier Transform
5.1 Motivation for using Fourier Transforms in OFDM systems
5.2 Concept of Fourier Transform
5.3 Discrete Fourier Transform (DFT)
5.4 Fast Fourier Transform (FFT)
5.5 Implementation

6. End-to-End Transmission
6.1 Transmitter and receiver components
6.2 OFDM operations

7. Summary
7.1 Put It All Together
7.2 Assess the knowledge of the participant based on the objectives of the course

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