5G and ORAN

Telecom Engineering
Maldives (Maldives)
03 - 07 Feb 2025

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5G and ORAN

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Introduction

5G is the fifth generation of wireless network technology, designed to provide faster data speeds, lower latency, and more reliable connections. One of the main goals of 5G is to support the growing demand for mobile data and enable new use cases such as autonomous vehicles, virtual reality, and the Internet of Things IoT.
Open Radio Access Network ORAN is a new approach to building wireless networks that emphasizes openness, interoperability, and software-defined architecture. ORAN aims to promote innovation and competition in the wireless industry by enabling operators to mix and match components from different vendors and create networks that are optimized for their specific needs.

Course Objectives for 5G:

1.   Understand the fundamentals of 5G technology and its architecture, including the differences between 4G and 5G networks.
2.   Learn about the key features and benefits of 5G, such as higher bandwidth, lower latency, and increased capacity.
3.   Understand the different types of 5G networks, including sub-6 GHz and mm-Wave, and their respective advantages and limitations.
4.   Explore the various use cases and applications of 5G, including IoT, smart cities, autonomous vehicles, and virtual reality.
5.   Understand the 5G network deployment options, such as non-standalone NSA and standalone SA, and the differences between them.
6.   Learn about the different 5G network components, such as base stations, antennas, and routers, and how they work together to deliver 5G services.
7.   Understand the challenges and limitations of 5G, including network security, regulatory compliance, and interoperability with legacy networks.

Course Objectives for ORAN:

1.   Understand the basics of open radio access network ORAN architecture and how it differs from traditional closed RAN.
2.   Learn about the key components of ORAN, including the radio unit RU, distributed unit DU, and centralized unit CU.
3.   Understand the benefits of ORAN, such as increased flexibility, scalability, and interoperability, and how it can accelerate innovation in the telecom industry.
4.   Explore the different ORAN deployment options, such as cloud-based and hybrid models, and the advantages and limitations of each.
5.   Learn about the different ORAN interfaces and protocols, such as O-RAN Alliance specifications, and how they enable interoperability between different vendors and operators.

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6.   Understand the challenges and limitations of ORAN, including network security, complexity, and the need for new skills and expertise.
7.   Explore the potential use cases and applications of ORAN, such as virtualized RAN, private networks, and edge computing, and their respective benefits and limitations.

Course Outline

Day 1
Introduction to 5G
*   What is 5G and how does it differ from previous generations of wireless networks?
*   What are the key features of 5G, including higher data speeds, lower latency, and massive connectivity?
*   What are the potential use cases for 5G, such as enhanced mobile broadband, ultra-reliable low-latency communication, and massive machine-type communication?

Day 2
5G Architecture
*   What is the architecture of a 5G network, including the core network, access network, and radio access network?
*   What are the different types of 5G deployments, including non-standalone NSA and standalone SA?
*   What are the different frequency bands used for 5G, including the low, mid, and high-band spectrum?

Day 3
5G Standards
*   What are the different standards bodies involved in developing 5G, including the 3rd Generation Partnership Project 3GPP and the International Telecommunication Union ITU?
*   What are the different 5G standard releases, including Release 15, Release 16, and Release 17?
*   What are the key features of each 5G release, including new use cases, network architecture improvements, and enhanced security features?

Day 4
Introduction to ORAN
*   What is ORAN and how does it differ from traditional wireless network architecture?
*   What are the key principles of ORAN, including openness, interoperability, and software-defined architecture?
*   What are the benefits of ORAN, including increased innovation, competition, and flexibility?

Day 5
ORAN Architecture and Implementation
*   What is the architecture of an ORAN network, including the radio unit, distributed unit, and centralized unit?
*   What are the different implementations of ORAN, including open RAN, virtual RAN, and cloud

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RAN?

- What are the different ORAN use cases, including greenfield deployments, network densification, and indoor coverage?

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