

5G and Open RAN

Course Duration

Instructor led: 1 day

Course Overview

This course provides an overview of 5G and Open RAN networks. It establishes important technical concepts and terms of 5G with the central 5G standard coming from 3GPP. The course discusses key core network, radio access network and radio interface aspects of 5G. The second part of the course focuses on joint technology and ecosystem aspects of Open RAN with the central point for the standardization, being Open RAN Alliance. The course discusses architecture, use cases, functions and Interfaces.

Prerequisites

The focus is on 5G overview and Open RAN networks and participants with general background in networks or telecommunication will be able to follow the course.

Course Agenda

Introduction to 5G

- Mobile systems evolution
- 5G overview and requirements
- 5G use cases: enhanced Mobile Broadband (eMBB), ultra-Reliable Low Latency Communications (URLLC), massive Machine Type Communications (mMTC), Vehicular-to-everything (V2X)
- Beyond 5G

5G Architecture

- 5G System (NG-RAN, 5GC)
- Dual Connectivity, Standalone (SA) vs Non-Standalone (NSA) 5G
- 5G Core and Service-Based Architecture (SBA)
- Cloud and virtualization: Mobile Edge Computing (MEC), Network Functions Virtualization (NFV) and Software Defined Networking (SDN)
- Network Slicing
- Private Mobile Networks (PMN), Integrated Access Backhaul (IAB) and Non-Terrestrial Access (NTA)

5G NR and NG-RAN

- 3GPP NR protocol stack and NG-RAN Architecture

- C-RAN and RAN disaggregation (CU, DU, RU)
- X-Haul (FrontHaul, MidHaul, BackHaul)
- 5G NR Technologies (mmWave communications, Massive MIMO, Beamforming)
- NR Physical Layer (OFDM and numerologies, Frequency Bands, Radio Resources Allocation)

Introduction to O-RAN

- From RAN to O-RAN transition
- Pros & Cons of O-RAN
- Open RAN integration aspects
- O-RAN ecosystem and standardization (roles of O-RAN Alliance, 3GPP, TIP, O-RAN Software Community, ONF)
- O-RAN Alliance specifications and workgroups
- O-RAN timeline and developments around the World

O-RAN Architecture

- Overall architecture of O-RAN
- 3GPP vs O-RAN architecture comparison
- Description of O-RAN functions and Interfaces
- Implementation options and deployment scenarios

RAN Intelligent Controller (RIC) and Use Cases

- Overview and functional split
- O-RAN control loops
- Non-RT RIC and A1 interface
- Near-RT RIC and E2 interface
- xApps vs rApps
- Overview of use cases and phases by O-RAN Alliance
- Open RAN Technical Priority Document

Notes: The course contents are subject to minor modifications. The hour split for each topic is related to the recorded sessions and is for informational purposes, thus for the instructor-led training it may be slightly different.

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