

## Deep dive into 5G New Radio Technology

### 5G NR Advanced course

This course provides **an in-depth description of 5G New Radio (NR)** technology as defined by 3GPP standards and specification.

Starting with a background on the 5G requirements, standardization landscape and roadmap, the course presents the end to end 5G system, including NG-RAN and 5GCore, architecture and air interface protocol structure. The discussion is then followed by a detailed description of the physical layer including time and frequency resource structure, channelization, scheduling, numerologies and release 16 & 17 features

The course also presents the step by step process followed by a UE from downlink synchronization to uplink access beam management. Given NR has the same technical foundation as LTE and is expected to co-deploy with LTE for many years the course also opportunistically makes comparisons with LTE system

### Who would benefit:

This training is aimed for Telecom Engineers, Managers and consultants with a technical background .This course provided by our, will allow you to have deep understanding of all 5G technical concept from Radio point of view with explanations on core part on IoT technologies and 5G use cases with current deployments.

## Training description

### 1) 5G concept and use cases

- What is 5G ?
- 5G promises
- 5G use case families: eMBB, URLLC, mMTC
- 3GPP position with 5G
- Services and requirements for vertical sector

## 2) 5G New radio

- What is spectrum
- What are 5G bands
- What is 5G New radio
- 5G New technologies
- Massive MIMO
- 5G Beamforming

## 3) 5G End to end architecture

- 5G radio architecture
- Standalone Vs Non standalone architectures
- 5G deployment options
- 4G to 5G migration strategies
- 5G Core architecture
- Network Slicing

## 4) 5G design and key radio functionalities

- 5G New Radio Physical Layer.
- Numerology and frame structure.
- Physical Channels Design and Structures.
- Bandwidth part introduction
- QoS Architecture in 5G NR

## 5) 5G Physical layer and design

- Comparison between 4G and 5G channels
- 5G DL Channels design and comparison with 4G
- PDCCH CORESET concept
- 5G UL Channels and comparison with 4G
- 5G Physical Layer Reference Signals

## 6) Beamforming and Initial Access

- 5G NR Initial Access
- SS Burst principle
- Beam Management in NR (Beamsweeping, Beam measurement...)
- Initial Beam establishment
- Beam Management SA and NSA

## **7) 3GPP features in Release 16 Release 17 and Release 18**

- 3GPP planning for Release 16&17&18
- Key subjects in release 16 and 17
- Focus on Release 18 features
- Industrial IoT features
- Other verticals features
- Network deployment and automations features
- Device enhancements

## **8) Internet of Things**

- Definition of IoT LPWA networks
- IoT technologies : Nb-IoT, LTE-M, and Lora
- Different kinds of IoT devices
- Description of IoT use cases
- Evolution of IoT technologies to 5G