Course : 5G non-terrestrial (5G-NTN)

Synthesis course - 2d - 14h00 - Ref. GSB
Price : 2020 CHF E.T.

NEW

5G has quite recently turned its attention to the satellite domain, bringing this subject to the forefront after it had long been sidelined in previous 3GPP standards. Treated as a study topic in the early phases of 5G standardization in R15 and R16, it has now entered the standardization phase in R17 and R18. The aim of this course is to present the architecture and protocols of terrestrial 5G, and then explore the specifics of non-terrestrial 5G (5G-NTN) using satellites and flying objects as connectivity relays.

Teaching objectives

At the end of the training, the participant will be able to:

- Understanding the fundamentals of terrestrial and non-terrestrial 5G
- Understanding terrestrial 5G architecture and protocols
- Understanding the specifics of non-terrestrial 5G (NTN 5G)

Intended audience

IT and network engineers, mobile network managers and design managers.

Prerequisites

Good knowledge of networks, IT or telecoms.

Course schedule

1 Introduction

- A brief review of global mobile radio standards, from 2G to 5G.
- Reminder of the main concepts in the mobile radio field.

PARTICIPANTS

IT and network engineers, mobile network managers and design managers.

PREREQUISITES

Good knowledge of networks, IT or telecoms.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

2 5G Terrestrial

- Why 5G? What benefits?
- Technological developments in 5G versus previous generations.
- 5G standardization timetable.
- 5G services: eMBB, mMTC and uRLLC.
- 5G radio: architecture, equipment and protocols.
- 5G on the core network side: architecture, interfaces and procedures.

3 NTN 5G principles and architecture

- Satellite systems: services, radio and frequencies.
- 3GPP pre-5G satellite solutions: backhauling and S-UMTS.
- NTN 5G network definition and objectives.
- Services, flying objects and related use cases.
- Management of delays, Doppler and liaison assessments.
- Radio aspects: RAN 5G NR NTN architecture and gNB split.
- The case of transparent or regenerative satellites and the bands used.

4 NTN 5G functions and integration

- Timing advance, RACH channel and MAC/PHY evolutions.
- Impacts on RLC, PDCP and SDAP layers.
- Satellite mobility and conditional handover.
- Core network architecture and session management.
- QoS, roaming and legal interception management.
- Interaction between 5G NTN and 5G terrestrial.
- NTN 5G NR and NTN NB-IoT optimizations.
- NTN NB-IoT/LTE-M scenarios: GEO, MEO and LEO.
- Future prospects (Release 19 onwards).
- 5G and drones/UAVs: uses and constraints.
- Alternatives to NTN 5G: Starlink and other initiatives.

5 Review and outlook

- Summary of 5G terrestrial and NTN contributions.
- Technical, economic and prospective issues.

Dates and locations

REMOTE CLASS
2026 : 9 Mar., 22 June, 31 Aug., 23 Nov.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.