

Private 4G/5G Networks – 2 days

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If you want to understand what private 4G/5G networks are all about or if you are planning on building one for your organization, this is the course for you. Whether you come from the IT industry and have been working with switches and WiFi access points or if you have a background developing, selling or building 3GPP infrastructure, this course will give you the tools to understand private networks, and what you need to think about building one. The course covers among other things business/use cases, technology, practical examples and useful tips on how to succeed with private 4G/5G business models.

Note: This course is not delivered with the FoldOut methodology.

PREREQUISITES

No prerequisites required.

TARGET AUDIENCE

System integrators, field engineers, WiFi network consultants, CIOs, CTOs, solution architects, presales engineers and solution sales engineers within the private network area, sales people, Internet Service Providers, Wireless Internet Service Providers, facility owners.

LEARNING OBJECTIVES

The course consists of modules with the following overall objective:

1. Explain what a private 5G network is, why they are deployed, who deploys them, which use cases they address and what the market trends for these types of networks look like.
2. Understand the overall architectures and key components of different types of networks in the IT and cellular industries
3. Understand the most important building blocks of enterprise networks and how private 4G/5G networks are deployed in this environment.
4. Explain the difference between licensed and unlicensed spectrum bands as well as basic Radio Frequency related concepts such as channel bandwidth, propagation, channels, filters and link budgets.
5. Describe the building blocks of a 4G/5G mobile network, explain the main differences between 4G and 5G and give architectural examples of how these networks can be built.
6. Explain the main practical differences between WiFi and 4G/5G networks, why these tracks of standards often are complementary and what is actually relevant to compare when deciding which access network type to go for.
7. Describe when and why organizations decide to deploy private 4G/5G networks.
8. Describe customer requirements on private 5G networks and how they are investigated in successful projects.

1. Introduction

- Course introduction (scope, agenda, modules, timing etc.)
- What is a private mobile network?
- Drivers for private 4G/5G networks
- Who deploys and uses private mobile networks?
- Why does the market for private networks take off now?
- The state of the market, challenges, opportunities and future outlook for private mobile networks

2. Wireless network flavours and the need for private 4G/5G

- Access networks
- IoT networks
- Asset/people tracking networks
- Fixed Wireless Access networks
- Private 4G/5G networks
- Neutral host networks
- Mixed networks and network orchestration

3. Enterprise networks and why they are important to understand for private 5G deployments

- Basic enterprise network building blocks
- Addressing, switching, routing, segmentation
- IT and OT
- Where private networks fit in
- The cloud and the edge
- Application Programming Interface (API)
- Challenges in IT networks
- IoT reference architectures related to enterprise networks

4. 4G and 5G radio and core equipment for private networks

- High level description of the 4G and 5G network evolution
- Main differences between 4G and 5G in private networks
- What makes 5G a “cloud-native” core network?
- 5G Network Slicing explained
- User plane security in 5G networks
- The components of a 4G/5G base station
- Operation and Maintenance with FCAPS support
- Troubleshooting private mobile networks
- Device ecosystems, device management, SIM and eSIM
- RAN/Core vendor types, service providers and the system integrator role in private networks

5. Licensed and unlicensed spectrum bands

- Spectrum and spectrum characteristics
- Licensed frequency bands
- Unlicensed spectrum bands for access networks and IoT
- Lightly licensed spectrum
- An example of a lightly licensed spectrum model: the CBRS

6. Practical differences between WiFi and 4G/5G networks

- Traditional WiFi business models
- Why do we need more radio protocols indoors?
- Application areas where private mobile networks fit in
- Practical and relevant differences between WiFi and private 4G/5G networks
- Carrier Sense Multiple Access (CSMA) limitations in unlicensed bands
- CSMA vs SINR based access
- Coverage comparison between WiFi and private 4G/5G
- Power control/consumption, spectral efficiency and range impact comparison
- Ways to combine WiFi and cellular networks to boost capacity/speed
- WiFi calling and other ways to handle voice in WiFi networks and private 4G/5G networks

- Mobility
- Security comparison between WiFi and 4G/5G
- End-to-end traffic management

7. When, why and how private 4G/5G networks are deployed

- How can private 4G/5G networks be delivered?
- Private 4G/5G network flavours
- Common challenges in private network deployment projects
- Why and when a private 4G/5G network is the right choice for:
 - Access networks
 - Neutral Host Networks
 - Asset tracking and wayfinding applications
 - Fixed Wireless Access (FWA) solutions
 - The Internet of Things (IoT) landscape
- Spectrum support for NB-IoT and LTE-M
- LoRaWAN as a complement to private 4G/5G networks
- Example of IoT architecture with integrated SIM/eSIM management

8. Customer requirements and network design

- Successful private 4G/5G customer journeys
- The impact of who you turn to when interested in private 4G/5G networks
- Private 4G/5G projects – who does what?
- Understanding use cases and alternative implementation options
- Defining technical requirements – is a private 4G/5G network actually needed?
- Examples of customer requirements on access networks, voice, video, IoT, FWA and asset tracking
- Spectrum considerations
- Security challenges
- What to consider when defining the production environment
- Do we need a pilot phase?
- Service provider considerations in access networks
- High Level Designs (HLD) and Low Level Designs (LLD)
- Planning and design of radio networks (examples of tools)
- Deployment and support
- The system integrator role

9. Summary

- Summary of objectives and what we have learnt during the course
- Reference Point model of the 5GS for non-roaming and roaming scenarios (both LBO and HR options)
- LTE, WiFi and fixed access in the 5G ecosystem
- UE identities in 5G: SUPI, SUCI, GPSI, PEI, etc.