# 5G Network Engineering Fundamentals Training Course

29 August – 2 September 2027
Manama

AGILE LEADERS
Training Center

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**Ref:** 1683_226558 **Date:** 29 August – 2 September 2027 **Location:** Manama **Fees:** 4700 Euro

## Overview

5G Network Engineering Fundamentals Training Course is a one-week foundation course for telecommunications and network teams, who leave with a 5G End-to-End Engineering and Flow Pack. The course connects service requirements, 5GS architecture, New Radio, spectrum, numerology, cells, beams, core functions, registration, PDU sessions, transport, synchronization, deployment options and operational evidence. Participants trace how radio and core decisions shape service behavior without entering vendor configuration. Agile Leaders Training Center develops practical 5G network engineering fundamentals.

## Who Should Attend

- Teams responsible for beginning work with 5G radio or core networks
- Network operations staff responsible for alarms, KPIs and flow evidence
- RF technicians responsible for measurements and coverage context
- Infrastructure specialists responsible for transport and synchronization interfaces
- Technical managers and sales teams responsible for explaining 5G engineering choices

The course assumes participants can read basic network diagrams and telecommunications terms at work, and leaves out advanced RF optimization, vendor command lines, certification preparation and spectrum policy.

## Departments and Industries

The course supports departments that plan, operate, integrate or use 5G connectivity.

- Mobile network engineering and operations
- Telecommunications infrastructure and managed services
- Transport, utilities and industrial connectivity
- System integration and technical consulting
- Enterprise networks and digital service teams

## Learning Objectives

By the end of this course, participants will be able to:

- Analyze 5G service requirements and system boundaries
- Use NR spectrum, numerology, cell and beam concepts
- Build end-to-end radio, core and transport maps
- Compare standalone and non-standalone deployments
- Diagnose registration and PDU session flow stages
- Evaluate KPIs, alarms and basic fault evidence

## Course Agenda

### Day 1: Services and 5G System Architecture

- 5G Use Case and Service Requirement Matrix
- 3GPP 5GS End-to-End Architecture Map
- User Equipment, NG-RAN and Core Boundary Diagram
- Control Plane and User Plane Separation Model
- Service, Slice and Data Network Relationship Canvas

### Day 2: New Radio Engineering Fundamentals

- Frequency Range and Channel Bandwidth Comparison
- NR Numerology and Frame Structure Map
- gNB, Cell, Sector and Beam Relationship Diagram
- Coverage, Capacity and Interference Trade-Off Matrix
- 3GPP Radio Measurement and KPI Reference Sheet

### Day 3: 5G Core and Service-Based Architecture

- AMF, SMF, UPF and UDM Function Map
- Service-Based Interface and Network Function Model
- Registration and Authentication Sequence Diagram
- PDU Session Establishment Flow Trace
- Policy, Data Network and User Plane Path Review

### Day 4: Deployment, Transport and Operations

- Standalone and Non-Standalone Deployment Comparison
- Radio and Core Interworking Boundary Map
- Transport Latency, Capacity and Resilience Checklist
- Timing and Synchronization Dependency Diagram
- Alarm, KPI and Escalation Evidence Matrix

## Day 5: Flow Analysis and Fault Practice

- Exercise: Map a 5G Service from Device to Data Network
- Exercise: Interpret NR Cell and Beam Measurement Evidence
- Exercise: Trace Registration and PDU Session Stages
- Exercise: Isolate Radio, Transport and Core Fault Domains
- Capstone: 5G End-to-End Engineering and Flow Pack

## Practical Exercises

Suggested activities use mobile broadband, industrial connectivity and transport-service scenarios.

- Suggested activity: translate a service need into radio, core and transport requirements
- Suggested activity: compare spectrum, numerology and beam choices for a coverage scenario
- Suggested activity: reconstruct registration and session establishment from flow evidence
- Suggested activity: assign an alarm pattern to the most likely fault domain and escalation route

## FAQs

### Who suits 5G network engineering fundamentals training and what does it assume?

5G network engineering fundamentals training suits telecom engineers, operations staff, RF technicians, infrastructure professionals and technical managers beginning 5G work. It assumes basic network-diagram literacy while excluding advanced optimization and vendor configuration.

### How does 5G network engineering differ from general mobile technology awareness?

5G network engineering connects service requirements to radio, core, transport, procedures, measurements and fault evidence. General awareness courses usually explain use cases and terminology without tracing system functions and operational flows.

### What is the difference between 5G standalone and non-standalone deployment?

Standalone deployment uses a 5G core with NR access, while non-standalone deployment combines NR with an existing mobile-network anchor. The architecture changes control paths, service capabilities, dependencies and operational evidence.

### Why are registration and PDU session flows important in 5G troubleshooting?

Registration and PDU session flows show where identity, mobility, policy, session and user-plane decisions occur. Tracing their stages helps teams separate radio reachability, core signaling, data-network and transport problems.

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## Conclusion

Participants take back a 5G End-to-End Engineering and Flow Pack containing service requirements, architecture maps, NR references, core-function diagrams, procedure traces, deployment comparisons and fault evidence. The pack makes 5G concepts traceable across radio, core and transport domains. It also gives teams a shared basis for monitoring and escalation.