Comprehensive Telecommunication System Engineering Course

1 – 12 February 2027
Berlin (Germany)



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Why This Course

The telecommunications industry is evolving at an unprecedented pace — driven by digital transformation, 5G deployment, and next-generation network technologies. The Telecommunication System Engineering Program is an intensive 2-week course designed to provide professionals with a deep, structured understanding of modern communication systems, from foundational network principles to emerging technologies shaping the industry's future.

Combining theoretical knowledge with real-world applications, this program equips engineers, network planners, and technical managers with the skills to design, implement, and optimize complex telecommunication networks. Participants will explore key concepts across digital communications, wireless systems, optical networks, and cybersecurity while gaining insight into next-generation innovations such as IoT, SDN, NFV, and 6G technologies.

What You'll Learn and Practice

By completing this program, participants will:

- Understand the principles, architecture, and standards governing telecommunication systems.
- Master digital communication techniques and network protocols.
- Design, analyze, and optimize wireless and optical communication networks.
- Evaluate the impact of emerging technologies such as IoT, SDN, and NFV.
- Develop strategic and technical skills in telecommunication system planning, implementation, and optimization.

The Program Flow

Day 1: Introduction to Telecommunication Systems

- Overview of telecommunication concepts and network evolution.
- Network architecture, topologies, and functional components.
- OSI and TCP/IP models and protocol layering.
- Overview of global standards, regulatory frameworks, and compliance.



Day 2: Digital Communication Fundamentals

- Analog-to-digital conversion principles.
- Sampling, quantization, and signal representation.
- Digital modulation and demodulation techniques.
- Error detection, correction, and channel coding.

Day 3: Transmission Media and Techniques

- Wired transmission: copper cable, coaxial, and fiber optics.
- Wireless transmission: radio, microwave, and satellite links.
- Multiplexing methods FDM, TDM, WDM.
- Channel capacity, bandwidth, and noise performance.

Day 4: Network Protocols and Switching

- Circuit switching vs. packet switching.
- Internet protocols: IP, TCP, UDP, ICMP.
- Routing algorithms, path optimization, and network hierarchy.
- Quality of Service QoS and traffic management mechanisms.

Day 5: Wireless Communication Systems

- Cellular network architecture and frequency reuse concepts.
- Mobile communication generations: 2G to 5G and beyond.
- Wireless LAN, Wi-Fi, and Bluetooth systems.
- Fundamentals of satellite communication and VSAT networks.

Day 6: Optical Communication Systems

- Principles of optical fiber transmission and light propagation.
- Optical network components and architectures.
- Wavelength Division Multiplexing WDM systems.
- Optical amplification, switching, and routing.

Day 7: Network Security and Encryption

- Core principles of cybersecurity in telecommunications.
- Cryptography, authentication, and encryption algorithms.
- Public Key Infrastructure PKI and digital certificates.
- Firewalls, VPNs, and network security protocols.



Day 8: Emerging Technologies in Telecommunications

- Internet of Things IoT and Machine-to-Machine M2M communication.
- Software-Defined Networking SDN and Network Function Virtualization NFV.
- Edge computing and distributed network intelligence.
- Integration of 5G with cloud and AI-driven applications.

Day 9: Telecommunication System Planning and Design

- Network design methodologies and planning frameworks.
- Capacity planning, traffic engineering, and performance modeling.
- Reliability, redundancy, and fault tolerance in network design.
- Economic analysis and cost optimization in telecom infrastructure.

Day 10: Future Trends and Case Studies

- 6G vision and next-generation wireless technologies.
- Quantum communication and advanced cryptography.
- Green telecommunications and sustainable network design.
- Global best practices and industry case studies.

Individual Impact

- Gain the expertise to design and manage next-generation telecommunication networks.
- Strengthen analytical and problem-solving skills for complex network challenges.
- Acquire hands-on understanding of digital, wireless, and optical communication systems.
- Build strategic foresight to adapt to emerging telecom technologies and standards.

Organizational Impact

- Improve network reliability, scalability, and performance across operations.
- Enhance technological readiness for 5G, IoT, and digital transformation.
- Reduce operational costs through optimized planning and innovative design.
- Build in-house technical leadership capable of driving telecom innovation.

Training Methodology

The program combines advanced theory with practical, industry-aligned learning through:

- Real-world case studies and simulation exercises.
- Network design and optimization workshops.
- Hands-on practice with telecom modeling tools and technologies.
- Expert-led discussions on regulatory, technical, and strategic challenges.



Beyond the Course

Upon completion, participants will be equipped to engineer, manage, and future-proof telecommunication systems that deliver high performance, security, and scalability.

Graduates of this program will emerge as telecommunication engineering leaders — capable of bridging innovation with infrastructure and driving progress in the global communications industry.

