Course : Telecommunications networks, implementation

Practical course - 4d - 28h00 - Ref. RKF
Price : 2790 CHF E.T.

This course, in which practical work plays a central role, will enable you to understand and implement the principles of telecommunications. It describes the standards used, architecture principles, equipment, services and applications available.

Teaching objectives

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

- ✔ Understand the vocabulary and principles of telecommunications networks
- ✔ Understanding the standards used
- ✔ Identify new telecommunications architectures and equipment
- ✔ Understand the main services and protocols

Intended audience
Technicians, IT specialists, engineers and network managers.

Prerequisites
Connaissances de base en informatique.

Practical details
Hands-on work
Alternating conceptual and practical presentations.
Teaching methods
Practical work accounts for between 50 and 70% of the session's time.

Course schedule

PARTICIPANTS
Technicians, IT specialists, engineers and network managers.

PREREQUISITES
Connaissances de base en informatique.

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.

1 Connection alternatives

- Twisted pair, coaxial and fiber optics.
- Wiring principle and rules.
- Wireless and Power Line Communication (PLC).
- Modems.
- DSLAM. NRA.

2 Fiber optic networks

- How is the FTTH market faring?
- Technologies used, current technologies: complement and/or replacement?
- Relevant applications of today and tomorrow.
- Technical specifics of each architecture.
- Manufacturers' fiber optic measurements.
- On-site measurement stages.
- Principle of photometry and reflectometry.
- Attenuation: fiber slopes, connectors and splices.

3 Mobile networks

- Frequency allocation, cellular concepts and radio engineering.
- Performance and service quality evaluation methods.
- Sizing of 4G networks (LTE/LTE-A).
- Sizing of access and collection networks.
- 5G-CN architecture: SDN, NFV, cloud, MEC, 5G entities (AMF, UPF, SMF, AUSF, UDM, PCF) and interfaces (Ni).
- Roaming vs. non-roaming, 5G-CN and 5G RAN interactions, interaction with 4G, slicing.
- 5G-CN procedures: exposed services, mobility management, traffic management, security management.
- 5G and IoT.

4 Internet of Things

- M2M/IoT: EC-GSM, LTE-M, NB-IoT?
- M2M/IoT network architecture: interfaces, equipment, protocols, procedures.
- Standards: WPAN, WLAN and LP-WAN solutions.
- V2V, V2X extension: concepts and principles, from Wi-Fi to LTE-V2X.
- Security: from authentication to encryption, solutions.
- A 5G close to M2M/IoT.
- Les protocoles : Zigbee, 6LowPAN, Thread, Wi-Fi, WiMax, Bluetooth Low-Energy (BLE), NFC, Neul, Sigfox, LoRaWAN.

5 Telephony over IP (ToIP), Voice over IP (VoIP)

- Voice coding, the command for ToIP.
- RTC signaling reminder, ss7.
- User identification, traffic management "Voice" in an IP network.
- QoS: meet bandwidth requirements and enable interactivity.
- Dimensioning to limit the "blocking" of calls; use of Erlang's law.
- The SIP protocol. The protocol. Voice signaling and flow mechanisms.
- Interfaces with protocols (DHCP, HTTP, DNS). SIP/H323 comparison.
- The different SIP components and their roles within the architecture.

6 Service quality

- MPLS support for Diffserv.
- RSVP-TE and OSPF-TE protocols.
- The joint implementation of QoS and TE, Diffserv-Aware TE.
- The Subnetwork Bandwidth Manager (SBM) protocol.
- How do I reserve resources with SBM?
- Spanning Tree and QoS.
- Reconfigure network with STP and RSTP protocols.

7 Operator telephone interconnections

- ToIP connectivity, crossing IP domains (STUN, TURN, ICE).
- SBCs (Session Border Controllers).
- Regulatory obligations.
- Use of E.164 numbers (ENUM).
- Security and ToIP.
- Interconnection architecture. Connecting PSTN operators. Connecting ToIP operators.
- The IP Packet Exchange concept.

8 The IPTV system and its components

- VoD services: RTSP/RTP, HTTP adaptive streaming, VoD and content delivery network.
- Head-end (IRD, video router, encoders).
- Access networks (DSL, FTTH).
- Content security (CAS, DRM).
- Definitions of DVB standards.
- Packeting (UDP/IP vs. RTP/UDP/IP).
- Live services: from head-end to STB, IP multicast transport (IGMP/PIM-SSM, IGMP snooping).
- Introduction to multicast on MPLS networks P2MP, content delivery network, zapping.