

TRAINING CATALOGUE
(COURSE DESCRIPTIONS)

IT and TELECOMMUNICATION NETWORKS & SERVICES



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Contents

FUNDAMENTALS IN TELECOMMUNICATIONS NETWORKS	10
5G NEW RADIO - <i>LIVE VIRTUAL</i>	15
CORE EVOLUTION TO 5G - <i>LIVE VIRTUAL</i>	17
MACHINE TYPE COMMUNICATION (MTC) OVER 5G - <i>LIVE VIRTUAL</i>	19
5G OVERVIEW	21
5G NR PHYSICAL LAYER	22
5G CORE CONCEPTS, PROTOCOLS AND PROCEDURES	24
5G CORE PROTOCOLS INCLUDING 5G ROAMING	25
5G NR FUNCTIONALITY & PROCEDURES	27
5G NR FUNCTIONALITY & SA ARCHITECTURE	29
5G PLANNING, NETWORK STRATEGY & OPTIMIZATION	31
RAN PERFORMANCE & OPTIMIZATION USING AI/ML TECHNIQUES	33
5G BUSINESS SUCCESS WITH NEW USE CASES	35
INDUSTRIAL IOT (COMMERCIAL) - <i>LIVE VIRTUAL</i>	37
INDUSTRIAL IOT (TECHNICAL) – <i>LIVE VIRTUAL</i>	39
IOT – TECHNOLOGIES AND APPLICATIONS	41
IOT – TECHNOLOGIES AND APPLICATIONS, ADVANCED	46
CLOUD AND VIRTUALIZATION PRINCIPLES - <i>LIVE VIRTUAL</i>	48
CLOUD AND VIRTUALIZATION	50
CONTAINERIZATION AND VIRTUALIZATION PRINCIPLES	52

OPENSTACK & KUBERNETES (K8S) INTRODUCTION, CONFIGURATION AND ADMINISTRATION	54
ARTIFICIAL INTELLIGENCE (AI) BASIC CONCEPTS - <i>LIVE VIRTUAL</i>.....	57
INTRODUCTION TO ARTIFICIAL INTELLIGENCE (AI) AND ITS APPLICATIONS ...	59
BOOST YOUR PRODUCTIVITY WITH GENERATIVE AI CHAT TOOLS	61
INTRODUCTION TO BIG DATA AND DATA ANALYTICS FOR BUSINESS.....	63
ARTIFICIAL INTELLIGENCE ESSENTIALS: WHAT EVERY BUSINESS LEADER SHOULD KNOW.....	64
AI-POWERED DOCUMENT AUTOMATION	66
DEVELOPING CONVERSATIONAL AI CHATBOTS.....	68
ROBOTIC PROCESS AUTOMATION (RPA) AND INDUSTRIAL AUTOMATION.....	70
NEXT-GEN ICT SECURITY: ARCHITECTURES, THREATS & COUNTERMEASURES	72
SUSTAINABLE IT PRACTICES AND ESG INTEGRATION	75
SQL SCRIPTING	77
RELATIONAL DATABASE MANAGEMENT SYSTEM (RDBMS) ADMINISTRATION	80
PL/SQL PROGRAMMING	83
VERY LARGE DATA IN SPREADSHEETS	86
BI DESIGNING AND REPORTING.....	89
PYTHON & DATA ANALYSIS.....	92
CONTINUOUS INTEGRATION/ CONTINUOUS DELIVERY (CI/CD).....	95
PERL PROGRAMMING.....	98
WEB PROGRAMMING.....	102

HADOOP OPERATION TRAINING	104
FTTH NETWORKS DESIGN AND DEPLOYMENT	107
SD-WAN SOLUTIONS, DESIGN AND DEPLOYMENT	108
VOLTE OVER IMS AND WI-FI CALLING – <i>LIVE VIRTUAL</i>	109
SIP PRINCIPLES – <i>LIVE VIRTUAL</i>.....	111
IMS/SIP TECHNICAL OVERVIEW	115
SIP PRINCIPLES, ANALYSIS AND TROUBLESHOOTING	117
IMS SIGNALLING – <i>LIVE VIRTUAL</i>	119
IMS (VOLTE) ADVANCED SIGNALLING	121
RAN INTRODUCTORY COURSE FOR NEW EMPLOYEES	123
4G-5G RADIO DESIGN PRINCIPLES FOR NEW/JUNIOR RAN EMPLOYEES	126
SMALL CELLS/INDOOR SOLUTIONS PLANNING (3G/4G/5G).....	129
LTE AIR INTERFACE.....	131
LTE PROTOCOLS AND PROCEDURES.....	133
LTE ADVANCED – FROM 3GPP RELEASE 11 TO 13	135
EPC (EVOLVED PACKET CORE) OVERVIEW	137
EPC ADVANCED SIGNALLING.....	138
EPC PLANNING & DESIGN	140
EPC TRANSPORT NETWORK PLANNING & DESIGN	142
WCDMA AIR INTERFACE	144
WCDMA PROTOCOLS AND PROCEDURES	146
HSPA SERVICES	148

CORE NETWORK SIGNALLING DESIGN.....	149
SIGNALLING OVER IP (SIGTRAN)	151
SECURITY CONCEPTS IN TELECOMMUNICATIONS NETWORKS	152
GSM AND GPRS SIGNALLING	155
IPTV NETWORKS AND SERVICES.....	158
CORE TRANSPORT NETWORK TECHNOLOGIES.....	159
INTRODUCTION TO THE TCP/IP PROTOCOL.....	160
MPLS OVERVIEW	161
SDH THEORY AND NETWORKS	162
IP/MPLS, MPLS-TP & CARRIER ETHERNET	163
TRAIN THE TRAINER FOR TECHNICAL INSTRUCTORS	164

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Our Training Methodology

How we Deliver

By blending various delivery tools in one course occasion, we aim to create an “experience” for the attendees, rather than a mere training seminar. In order for the trainees to get the maximum benefit from a training program, we have developed a delivery style with a range of characteristics, which enables people to learn better and with fun.

The following delivery characteristics are actively employed:

Visualization: By using slide images as training material, we convey messages in a simpler way than by using only course textbooks.

Logical Transition from Theory to Exercises and Implementation: Introduction with theory serves as the basis for exercises and practical implementation, whereby the relevance of theory to the applied exercises is clearly explained.

Games and Role-Plays: enable knowledge assimilation in an enjoyable, motivating, engaging, memorable and thus highly effective way by putting the theory into practice.

Practical Exercises: are structured around implementing the knowledge attained.

Converse and Question: in an interactive training event, allows the participants to infer results and devise solutions through the instructors’ structured advisory approach.

Certificate of Successful Course Completion: since the participants are continuously actively engaged, after course completion a test is administered, and a certificate of successful course completion is issued.

Though, the effective training delivery -as an event - is in the center of our attention, the quality of the knowledge and competence transfer process does not culminate in the implementation of the seminar. In a wide sense the course event commences with planning and preparation and concludes with the follow-up.



“Comprehensive” training delivery process

During the **Preparation** phase we use our knowledge of the participants’/customers’ challenges, to customize the training course in order to meet exactly their requirements.

The **Follow-up** process is not limited to the typical course evaluation form. Throughout the training delivery, our instructors may identify areas for further improvement and after the course delivery they prepare a short Course Delivery Report with these findings, among others. In consultation with our partners/customers, we provide support on the next actions addressing those eventually challenging issues.

Live Virtual Trainings Vs On-Site Instructor-Led Training

Apart from standard Instructor-Led Training in a classroom environment, typically at customer premises or business centers we deliver Live Virtual (aka Virtual Classroom) trainings which eliminate the travelling cost and inconveniencies.

Live virtual is an optimal solution for geographically distributed groups who wish to attend live closed-group training sessions or very small groups or individuals who wish to join in live open-seat scheduled courses.

Trainer experience/skills and efficient use of remote collaboration technologies enable us to deliver engaging instructor-led real-time courses connected to trainee's personal computer or device anywhere and at any time-zone.

Our live virtual trainings are well proven and have been used to deliver training to our customers on a global basis.

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Fundamentals in Telecommunications Networks

Course Objectives

This course will offer to the participants the opportunity to understand the basic concepts of Telecommunications.

This course is modular and it can be split into shorter individual sessions or it can even be customized to a shorter duration, including only the content and daily modules, which are of particular interest to the target audience.

The purpose of this course is to explain the terms and concepts of today's world of telecommunications and data networks.

By the end of the course the participants will acquire the basic technology understanding on Telecommunication Networks, Technologies and Services.

Contents

- Introduction
 - History of Telecom Technologies
 - Wireless Generations Evolution
 - Different services by different technologies
 - End to End Network Overview
- Wireless Access Networks
 - 2G RAN overview
 - 2G services and procedures
 - 3G RAN overview
 - 3G RAN services and procedures
 - LTE RAN overview
 - LTE services and procedures
 - Mobility overview
- Fixed Networks
 - Fixed Access Network Block Diagram
 - Fixed-Mobile Convergence
- Core Systems and nodes
 - CS Core nodes description and functionalities overview
 - PS Core nodes description and functionalities overview
 - EPC nodes description and functionalities overview
 - IMS nodes description and functionalities overview
- Traffic flows
 - End to end CS voice call
 - End to end PS voice call
 - CS Fallback, ICS and SRVCC
 - End to end data session flow
- Comparison and differences between the networks
- Network Management Systems and procedures

- Node Modularity and Upgrade Procedures
- Data Networks and Next Generation Networks (NGN)
- Value Added Services (VAS)
- Key Technologies (LMDS, ATM, VoIP, IMS, xDSL, WiFi, WiMax, LTE, IPTV)
- Towards tomorrow
 - Cloud and Virtualization in telecoms – the 3GPP approach
 - IoT overview – the 3GPP approach
 - 5G – what to expect from 5G
 - Network slicing overview

Entry Requirements

None.

Target Group

This course is available for:

- Non-technical professionals from Human Resources, Business Management, Product Marketing, Sales and Logistics, Project Management, Customer Care and Retail Shops, who need an appreciation of the concepts and terminology, used every day in the Telecommunication industries.
- Anyone working in the telecoms or networking industry needing an understanding of the principles of telecommunication and networking as a part of his/her role.

Mode of Delivery

Instructor-led training with theory, games, short tests and short case studies.

Duration

The duration of the course as a whole is 5 days. It can be broken down to small knowledge packages of interest with the relevant shortened duration

Participants

Due to exercises, case studies and short tests, the maximum number of participants is 10.

Language

English

Daily Time Plan

The topics of the course and the daily schedule are depicted in the table below:

Topics in the course

Day 1	Introduction, History and Telecommunication Networks Overview
Day 2	Wireless Access Networks
Day 3	Fixed Access Networks Core Networks
Day 4	Value Added Services (VAS) Key Technologies Overview
Day 5	Call flows Towards Tomorrow

Introduction to 5G - *Live Virtual*

Course Description

You have heard already about 5G and that is about to arrive soon. What does it mean though for a Network Operator and a user? This virtual course is exploring the characteristics of 5G as described so far from the specification institutions. We will introduce you to the basic concepts, the fundamental characteristics and the architecture of 5G, mentioning also the considerations related to 5G roll out. We will discuss the milestones of 5G deployment to know what to expect and when should be expected.

Contents

- Network Technologies Evolution
 - The path to 5G
 - 5G expectations
- 5G Architecture
 - New Radio basics
 - 5G Core basic concepts
 - Cloud and Virtualization
 - Network Slicing
- 5G Milestones
 - When shall we see things happening

Entry Requirements

A good understanding of Mobile Networks

Target Group

Technical department staff

Mode of Delivery

Live virtual training.

Duration:

1 session, 3 hours.

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics in the course	Estimated Time (hours)
1	5G Introduction – Evolution of Networks	1
	5G Architecture and basic concepts	1.5
	5G Milestones	0.5

5G New Radio - *Live Virtual*

Course Description

If you have been in telecom business for some years you know that in wireless networks each generation brings a breakthrough in the Radio Access Network. 5G is not an exception to that, so join us to discuss about the New Radio in this virtual session. We will visit the new concepts and features it brings and the changes we should expect in topology, architecture and deployment of New Radio. Together we will be one step closer to welcome the 5G which is just around the corner.

Contents

- Evolution of networks
 - The road to 5G
 - 5G Targets
- 5G RAN Architecture
 - New Radio basics
 - 5G Features
 - NR Topology Options
 - NR and Network Slicing
- 5G Milestones
 - What is coming and when

Entry Requirements

A RAN background would be beneficial, ideally with 4G.

Target Group

Radio Network Staff.

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics in the course	Estimated Time (hours)
1	Evolution of Networks	0.5
	5G RAN Architecture and NR basic concepts	1.5
	5G Milestones	0.5

Core Evolution to 5G - *Live Virtual*

Course Objectives

This course explores the architecture and technical concepts for the 5G core network.

It describes the 5G Core concepts of Network Slicing, Virtual Core, 5G Service-based Architecture, CP/UP separation etc.

Contents

- Explore the needs for developing the 5G Core e.g. new stakeholders etc.
- 5G Core standardization present status and history.
- Evolved network architecture and technology for the 5G Core e.g. Architecture, Interfaces
- 5G Service Based Architecture
- Network Slicing
- CP/UP separation

Entry Requirements

General Telecom networks and IT services knowledge and/or working experience

Target Group

Managers and Engineers wishing to be familiar with the 5G Core concepts and Principles

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Session	Topics	Estimated Time (hours)
1	Needs for developing the 5G Core & 3GPP standardization present status and history	1
	Evolved network architecture and technology for the 5G Core	1
	5G service based architecture vs 5G reference based architecture	1

Machine Type Communication (MTC) over 5G - *Live Virtual*

Course Description

5G is almost here, ready to serve the networked society. During this virtual session, we discuss how the IoT as we know it will be handled by this new technology. We will see the different types of MTC and their requirements as well as the challenges that need addressing.

Contents

- Introduction to 5G
 - 5G Basics
 - 5G Targets
- MTC characteristics
 - Massive MTC requirements
 - Critical MTC requirements
 - uRLLC specifics
 - Security Concerns
- MTC in action
 - Example use cases

Entry Requirements

A generic Telecom background.

Target Group

This session is for both technical and non-technical audience.

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics in the course	Estimated Time (hours)
1	Introduction to 5G and MTC	0.5
	MTC features and challenges	1.5
	5G MTC use cases	0.5

5G Overview

Course Objectives

By the end of this course the participants will learn about the new technology identified as 5G how it is built and how can be exploited to generate more revenues.

Contents

- Understand what is 5G
- Identify 5G use cases and their respective requirements
- Understand the 5G Mobile Broadband objectives
- Identify the 5G Radio technology areas involved
- Describe the Services associated with the new technology
- Understand and explain the core network architecture
- Evaluate the technological, common challenges and disadvantages of the new technology

Entry Requirements

Knowledge on basic telecommunication concepts and ideally experience with WCDMA & LTE networks.

Target Group

Personnel involved in radio network operations, planning and optimization, service engineers, network design engineers.

Mode of Delivery

Instructor-led training, theory.

Duration

1 day

Participants

The maximum number of participants is 16.

Language

English

5G NR Physical Layer

Course Objectives

By the end of this course the participants will learn about the Air Interface of the 5G NR. From initial access to the allocation of resources and the beamforming techniques of the radio transmissions.

Contents

- Introduction and Network Architecture
- The structure of the physical layer
- The frame structure
- The NR Channels and their relation to LTE
- Bands Bandwidth and Flexible Numerology
- Procedures on physical layer control plane
- Description of the Synchronization and Reference Signals
- The Random Access and the initial Beam formation
- Procedures on physical layer User Plane
- The Reference signals related to the User Plane
- Massive MIMO concepts in 5G NR
- Codebook-based versus non codebook-based transmissions
- Analogue versus Digital Beamforming
- The concept of Beam management

Entry Requirements

Knowledge of telecommunication concepts and ideally experience with WCDMA & LTE networks. 5G knowledge at overview level.

Target Group

Technical Personnel such as System Engineers, Service Engineers, Planning and Optimization Engineers, Service Design Engineer.

Mode of Delivery

Instructor-led training, theory.

Duration

2 days

Participants

The maximum number of participants is 16.

Language

English

5G Core Concepts, Protocols and Procedures

Course Objectives

The course describes the concepts of the 5G Core Network. It explains the 5G Core Network architecture, functions and the concepts of Network Slicing, Control Plane (CP) / User Plane (UP) Separation, 5G QoS. It describes the interfaces in 5G Core Network, the protocols and the main signaling scenarios Registration, PDU Connection, Session management and Mobility.

Contents

- 5G Core Concepts and use cases (eMBB, Massive and Critical MTC)
- Network Slicing
- Control Plane (CP), User Plane (UP) Separation
- 5G Deployment Options
- 5G Core Network Architecture (Service and Reference point based architecture)
- 5G Core Functions (e.g. AMF, SMF, UDM)
- 5G Core Network Interfaces (Nx) and Protocols (HTTP based communication)
- Session Management and QoS flows
- 5G Core Network Procedures (Registration, PDU Session, Mobility)

Entry Requirements

Knowledge of telecommunication concepts and ideally experience with WCDMA & LTE networks. 5G knowledge at overview level.

Target Group

Technical Personnel such as System, Service, Planning and Service Design Engineers.

Mode of Delivery

Instructor-led training, theory.

Duration

2 days

Participants

The maximum number of participants is 16.

Language

English

5G Core Protocols including 5G Roaming.

Course Objectives

This course has been designed for professionals seeking to develop a solid understanding of the 5G Core Protocols and 5G Roaming Principles and Practices.

The course explains the architecture and technical concepts for the 5G core network. protocols and the signaling used in the 5G Core (5GC) network. Describes the interfaces in 5GC as well as various 5GC use case scenarios such as Connection, Registration, Mobility, and Session management in HPLMN and in VPLMN, based on the 3GPP Release 16.

- Explain the basic conceptual network architecture and technology for the 5G Core.
- List and explain identifiers relevant for the 5GC.
- List the interfaces and explain the signaling, protocols and service exchange between the network functions.
- Explain service-based interfaces.
- Explain the main concepts of Network Slicing.
- Explain the N1 and N2 control plane interfaces towards access networks.
- Explain the N3 user plane interface towards access networks.
- Explain the N4 interface between control plane and user plane.
- Explain the Registration Procedures.
- Explore the Service Request Procedures.
- Examine the Session Management Procedures.
- Identify the Security Edge Protection Proxy (SEPP).
- Explain the N32 and N9 Roaming Interfaces.

Entry Requirements

Mobile Networks knowledge background and/or working experience.

Target Group

Core Network Support Engineers and operations personnel.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2 days

Language: Lectures in Greek and/or English, course material in English

Participants: The maximum number of participants for this course is 12

Time Plan

The following time plan is indicative, exact time required per topic always depends on the needs and prior knowledge of the attendees.

Day	Topics	Estimated Time (hours)
1	Describe the basic conceptual network architecture and technology for the 5G Core	3
	List the interfaces and explain the signaling, protocols and service exchange between the network functions.	3
2	Analyze the basic procedures for 5GC Core	2
	5G Roaming Principles and Practices	4

5G NR Functionality & Procedures

Course Objectives

The course "5G NR Functionality & Procedures" is about the 5G RAN, Non-Stand-Alone (NSA) and Standalone (SA) functionalities and procedures.

The course describes the Idle State Behavior, along with discussing Link Adaptation, Scheduling and Mobility behaviors, with their respective procedures.

Contents

- Introduction of NR Network Architecture and NR Functionality
- The differences of SA versus NSA in the NR cell Operation
- The TDD patterns and the concept of Special slots
- Idle Mode Behavior Characteristics
- System Information in SA & NSA NR
- Cell Selection and Re-selection procedures
- Paging functionality and procedures
- Open loop and closed loop Power control
- The Link Adaptation functionality
- The essential Scheduling principles
- Xn, intra- and inter gNodeB Handovers
- Description of Mobility events and measurement reports
- NR in Inter-frequency and IRAT mobility
- NSA traffic and Mobility procedures

Entry Requirements

Knowledge of telecommunication concepts and ideally experience with WCDMA & LTE networks. 5G knowledge at overview level.

Target Group

Technical Personnel such as System Engineers, Service Engineers, Planning and Optimization Engineers, Service Design Engineer.

Mode of Delivery

Instructor-led training, theory.

Duration

2 days

Participants

The maximum number of participants is 16.

Language

English

5G NR Functionality & SA Architecture

Course Objectives

The course is about the 5G RAN functionalities and procedures primarily in the context of Standalone (SA) architecture.

The course provides a comprehensive introduction to 5G SA and describes the Idle Mode Behavior, along with Scheduling and Mobility behaviors, with their respective procedures.

Contents

- Introduction to 5G SA Architecture: Overview of the 5G core network components, including Control Plane (CP) and User Plane (UP) separation, and how they differ from Non-Standalone (NSA) configurations.
- Key Features of 5G SA: Understanding network slicing, ultra-reliable low-latency communication (URLLC), and enhanced mobile broadband (eMBB) capabilities (in brief)
- The differences of SA versus NSA in the NR cell Operation
- Idle Mode Behavior Characteristics
- System Information in SA & NSA NR
- Cell Selection and Re-selection procedures
- Paging functionality and procedures
- The essential Scheduling principles
- Xn, intra- and inter gNodeB Handovers
- Description of Mobility events and measurement reports
- NR in Inter-frequency and IRAT mobility

Target Outcomes:

Participants will leave the course equipped with actionable strategies and insights to enhance their competences and practices in view of 5G SA deployment and beyond.

Entry Requirements

A foundational understanding of mobile communication systems, including 4G (LTE) and 5G technology.

Experience in radio network design and optimization

Knowledge of RF concepts and principles

Target Group

Radio Planning and Optimization Engineers

Mode of Delivery: Instructor-led learning in a virtual or physical classroom

Language: English

Duration: The duration of this course is two days

5G Planning, Network Strategy & Optimization

Course Description

In the rapidly evolving landscape of mobile communications, understanding the complexities of 4G and 5G network planning, strategy, and optimization is crucial for engineers dedicated to enhancing network performance and user experience. This training course is designed specifically for Radio Planning and Optimization engineers who seek to enhance their knowledge in planning and optimizing modern mobile networks.

Objective

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

- Summarize the fundamental concepts and differences between 4G and 5G technologies.
- Develop effective network planning strategies that leverage the advantages of both 4G and 5G networks.
- Implement optimization techniques to enhance network performance and coverage.
- Analyze the impact of various factors, such as user density and traffic patterns, on network design and optimization.
- Explain advanced tools and methodologies for successful radio planning and network rollout.

Contents

1. **Introduction to 4G and 5G Technologies**
 - Overview of LTE and NR standards
 - Key features and enhancements of 5G over 4G
2. **Network Planning Strategies**
 - Capacity and coverage planning for 4G and 5G
 - Integration of legacy networks with new technologies
 - Site selection and backhaul considerations
3. **Optimization Techniques**
 - Performance metrics and KPIs for 4G and 5G networks
 - Techniques for interference management and resource allocation
 - Tools for predictive modeling and simulation
4. **Case Studies and Real-World Applications**
 - Analysis of successful implementation strategies
 - Discussion of challenges faced and solutions deployed
5. **Q&A Session and Group Discussion**
 - Engaging interactive session to address specific participant questions and foster collaborative problem-solving.

Target Outcomes:

Participants will leave the course equipped with actionable strategies and insights to enhance their planning and optimization practices in modern mobile networks. This training will not only

empower engineers to effectively manage current projects but also prepare them for the future demands of 5G deployment and beyond.

Entry Requirements

A foundational understanding of mobile communication systems, including 4G (LTE) and 5G technology.

Experience in radio network design and optimization

Knowledge of RF concepts and principles

Target Group

Radio Planning and Optimization Engineers

Mode of Delivery: Instructor-led learning in a virtual or physical classroom

Language: English

Duration: The duration of this course is two days

RAN Performance & Optimization using AI/ML Techniques

Course Objectives

This course introduces participants to the integration of Artificial Intelligence (AI) and Machine Learning (ML) techniques in the monitoring, optimization, and enhancement of Radio Access Network (RAN) performance. The focus is on practical applications of AI/ML-driven insights for KPI improvement, automation, and root cause analysis within 4G and 5G network environments.

Participants will gain hands-on understanding of how AI/ML can automate optimization workflows, improve troubleshooting accuracy, and enhance the efficiency of radio planning and operations.

Contents

- Introduction to RAN Performance Optimization
 - Key RAN KPIs: Accessibility, retainability, mobility, throughput
 - Overview of classical vs AI-driven optimization approaches
- AI/ML Fundamentals in the Context of Telecom
 - Basics of machine learning for engineers
 - Supervised vs unsupervised learning for performance analytics
- Data Sources and Preprocessing
 - KPI datasets, OSS, drive tests, probe data
 - Data cleansing, feature engineering, and model input structuring
- Use Cases of AI/ML in RAN Optimization
 - Anomaly detection in KPIs
 - Traffic forecasting and capacity planning
 - Clustering techniques for cell/devices performance classification
 - Coverage hole / interference spot identification
 - Smart Energy saving
 - Mobility event optimization using AI
 - Automated parameter tuning (e.g., HO, reselection, power control)
- Automation Frameworks and Tools
 - Overview of AI/ML tools applied to RAN
 - Role of OSS, third-party analytics, and custom ML pipelines
- Performance Impact Assessment
 - Model evaluation metrics and field validation techniques
 - Integration with existing network monitoring workflows
- LLMs for Root cause Analysis
 - How LLMs can speed up RCA in 4G/5G RAN by analyzing KPIs, counters, logs and configuration context together

- How to use prompt templates to produce ranked root-cause hypotheses with evidence and next validation steps
 - How to apply guardrails (RAG, rules, confidence scoring, human review) for reliable, engineer-ready outputs
- Future Trends and Next Steps
 - Towards cognitive RAN and self-optimizing networks (SON)
 - Role of AI in Open RAN (O-RAN) architectures

Target Outcomes

Participants will be equipped with the competence to:

- Understand and evaluate AI/ML techniques applicable to RAN optimization
- Apply data-driven methods to improve KPI performance
- Support the evolution toward automated and cognitive network operations

Entry Requirements

A foundational understanding of mobile communication systems, including 4G (LTE) and 5G technology.

Experience in radio network design and optimization

Knowledge of RF concepts and principles

Target Group

Radio Planning and Optimization Engineers

RAN Performance Analysts

Technical Professionals working with network analytics and automation

Mode of Delivery: Instructor-led learning in a physical virtual classroom

Duration: The duration of this course is three or four days

5G Business Success with New Use Cases

Course Objectives

By the end of this course the participants will learn about the new disruptive technology of 5G, how it is built and how it can be exploited to generate more revenues.

The course explains the evolution in Mobile Networks and the new virtualized infrastructure of the Mobile Networks as a prerequisite to 5G.

It also examines how the 5G technology can be an enabler for developing new Use Cases. During this course the participants will understand the key features and capabilities and how these will be used in a variety of Applications in different verticals to enhance the connectivity of all human activities.

Contents

- 5G Architecture Overview
 - Mobile Network Evolution
 - Cloud Computing and Virtualization, benefits for Mobile Operators
 - 5G New Radio
 - 5G Core
- The 5G Key Factors
 - 5G Business Strategies
 - 5G Frequency Spectrum Flexibility
 - Cloud and Topology Flexibility
 - 5G Quality of Service
- Use Cases and Examples
 - Advanced Telematics
 - Video Monitoring & Detection
 - Connected Machinery & Equipment
 - Smart Grid – Connected Energy
 - Smart Cities
 - Intelligent Transport Systems
 - Consumer/User Experience Use Cases
 - Healthcare

- Agriculture and Food Industry
- Edge Computing and Artificial Intelligence
- Fixed Wireless Access & 5G Wireless To The Premises (WTTx)

Entry Requirements

General Business and Telecom understanding

Target Group

Non-Technical Personnel from HR, Business Management, Marketing, Sales, Logistics, Project Management, Customer Care, and Retail, wishing to look at 5G from the business perspective and understand its impact to the evolving mobile network. Technical Personnel from all levels and functions can also attend the course.

Mode of Delivery

Instructor-led training, theory

Duration

1-2 days

Participants

The maximum number of participants is 16

Language: English

Industrial IoT (Commercial) - *Live Virtual*

Course Description

Join us in this virtual course to discuss the basics of IoT from a commercial, informative perspective. We will examine on high level the IoT Architecture and the different Technologies used for the realization of an IoT solution. You will also have the opportunity to see several IoT use cases and applicable examples from different sectors.

Contents

- What is the Internet of Things?
 - The road from connected devices to Artificial Intelligence
- How is it built?
 - The IoT Architecture
- IoT and digital Transformation
- Use cases
 - Smart Cities
 - Industrial IoT – Industry 4.0
 - Agriculture
 - Healthcare and Wellbeing
 - Consumer electronics
- How do we monetize IoT?
 - The IoT Marketplace

Entry Requirements

A basic understanding of Technology Applications

Target Group

Anyone interested in how Technology is shaping today's world

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours

Participants

The maximum number of participants is 8.

Language

English

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics in the course	Estimated Time (hours)
1	IoT Introduction, Architecture and Technologies	1.0
	Digital Transformation	0.5
	Use cases of IoT	1.0
	IoT monetization	0.5

Industrial IoT (Technical) – *Live Virtual*

Course description

The global trend of digitalization, enabled and enhanced by IoT technologies across all sectors, are changing the face of automation. Products, services and business models are transformed in the connected, real-time and data-driven marketplace. New service offerings are made possible via IoT technologies.

This course provides an overview and insight of the Internet of Things (IoT) concepts, standards, technologies and applications. The participants will be informed about what a digitally connected enterprise is, will become also acquainted with the available tools, technologies and techniques together with products and features, requirements, use cases, and network description.

Contents

- IoT, Internet of Things Overview
 - The IoT market landscape.
 - IoT Technologies and Applications
 - Why IoT?
 - IoT connectivity options.
 - Explain the Standardization in IoT
 - Highlight the IoT related network evolution
- IoT Enabling Technology
 - What makes IoT possible?
 - Big Data
 - Big Data Analytics
 - IoT functional stack
 - IoT devices and gateways characteristics
- IoT Technical requirements
 - Internet of Things (IoT) Protocols
 - Describe the network architecture
 - Cloud Computing
 - SDN and NFV
 - Artificial Intelligence
 - 5G in the IoT context
- IoT use cases
 - Smart Cities
 - Healthcare
 - Smart home and the Smart Home Ecosystem
 - Industrial Applications (Industry 4.0)
 - Security Applications
 - IoT vs. Industrial IoT
 - List typical applications of IIOT in the industry

Entry Requirements

Knowledge on Telecommunications and Networking.

Target Group

Professionals interested to learn about IoT technologies.

Mode of Delivery

Live virtual training.

Duration

2 sessions, 6 hours in total

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	• Explain the concept of Internet of Things (IoT)	1
	• Describe the Enabling Technologies and requirements	2
2	• Describe the Enabling Technologies and requirements, continued	1
	• List the Internet of Things use cases	2

IoT – Technologies and Applications

Course Objectives

This course provides an overview and insight of the Internet of Things (IoT) concepts, standards, technologies and applications. You will learn how to:

- Describe IoT architecture, enabling technology and solutions
- Understand IoT applications and services
- Analyze IoT case studies and strategies

Contents

1. IoT, Internet of Things Overview

Terms and Acronyms (to be used as backup slides)

Introduction

Definitions

Type of Devices

IoT history and evolution

Heterogeneous Networks

Machine to Machine

IoT Technologies and Applications

Why IoT?

- IoT Market Trends / Predictions
 - Research Outcomes (indicative list)
 - Vendors / Network Operators (indicative list)

2. IoT Enabling Technology (1,5h)

Big data

Big Data Analytics

- NoSQL
- HAdoop

What makes IoT possible?

- Backend Systems
 - Cloud Computing
 - SDN and NFV
 - Artificial Intelligence
- Data transmission technologies (network)
 - 2G/3G/LTE
 - Wired/Wireless Ethernet
 - Satellite

- Front End Devices / Technologies
 - DSPs and GPPs
 - SoC
 - M2M
 - Sensing technologies
 - Wearables
 - NFCs and other SRCs
- Industrial Internet

3. Standardization

IoT reference model

International and Regional SDO

Industrial

Other bodies

IoT Key Standards

4. The Internet of Things - Software agents and Cloud services

Agents (examples)

Distributed Intelligence

Centralized Intelligence

Clouds - Private clouds

Enterprise Agents

Agents and clouds

Clouds and Services

Cloud based IoT platforms

IoT Platforms and Platform Providers:

- Cisco – Jasper
- IBM – Watson
- Amazon – AWS IoT
- Microsoft – Azure IoT
- Google – Brillo
- Hewlett Packard – HPE IoT

5. IoT Architecture and Solutions

IoT Technologies

Hardware and firmware

- Connectivity considerations
- Sensors and wireless sensor networks
- Intelligent Electronic Device, IEDs
- Radio Frequency Identification (RFID)
- Security

- Serviceability
- Powering considerations
- People & processes
- Hubs
- Fog Computing

Enablers

Engagers: Connecting to Customers

Enhancers: Creating New Value

Service characterization

Network considerations

IoT Interoperability

IoT Identification, Naming and Discovery

Exploiting ubiquitous connectivity

6. IoT Communication and Networking characteristics

Networking Technologies

- Cellular networks
- Frequency Allocation considerations
- RF Technologies / Standards
- Low Power RF interface design considerations

White Space

Weightless

Mesh Networks

Wireless Ethernet and IoT

Other networking technologies

7. IoT Applications

Smart Cities

E-Health

Precision Agriculture

Healthcare

Smart home and the Smart Home Ecosystem

ITS

SWM

Smart Cities

Industrial Applications

Security Applications

8. Ecosystem Players

IoT Winners

Data Managers

Kickfunding

Utilities

SCADA

Municipal Things

9. The Internet of Things Privacy Implications

Security in IoT implementation

Privacy

European Privacy Directive

Criticism controversies and Political Ramifications

Privacy, Autonomy and Control

Design

Environmental impact

10. Strategy, IoT

A Strategist's Guide to the Internet of Things

Evolution and Opportunity

Your Company's IoT Strategy

Business models on IoT

Summary of telco operator strategies

Building IoT Products and solutions

11. Case studies

Cisco Intercloud

M2M Scenario – Ice Cream Cabinets

Business Value

Bluetooth Socks

Wi-Fi Mesh

Awesense Mesh

Whispernet

Google Nest

Entry Requirements

Telecom/IT networks general knowledge, ideally IP Networking/Planning

Target Group

Product Marketing Engineers, Service Engineers, Network Design Engineers

Mode of Delivery

Instructor-led training with theory and practical examples.

Duration

2 days

Participants

The maximum number of participants is 12.

Language

English

IoT – Technologies and Applications, Advanced

Course Objectives

This course provides an in-depth insight of the Internet of Things (IoT) concepts, standards, technologies and applications, in continuation of the IoT – Technologies and Applications 2 day seminar. You will gain:

- In depth knowledge of IoT applications and services
- Expertise on IoT solutions & strategies

Contents

1. IoT, Internet of Things Applications (3h)

Terms and Acronyms (to be used as backup slides)

- IoT Applications
 - Smart Cities
 - Municipal Energy Management
 - Municipal Operations Management
 - Municipal Services
 - Business to Business (B2B)
 - Business to Consumer (B2C)
 - E-Health
 - Remote patient monitoring
 - Prescription Assistance
 - Precision Agriculture

2. IoT Architecture and Solutions (2h)

IoT Technologies

Hardware and firmware

- Connectivity considerations
- Sensors and wireless sensor networks
- Intelligent Electronic Device, IEDs
- Radio Frequency Identification (RFID)
- Security
- Serviceability
- Powering considerations
 - Low power electronics design
 - Energy Harvesting
- People & processes
- Hubs
- Fog Computing

Enablers

Engagers: Connecting to Customers

Enhancers: Creating New Value

Service characterization

Network considerations

IoT Interoperability

IoT Identification, Naming and Discovery

Exploiting ubiquitous connectivity

3. Strategy, IoT (2h)

- A Strategist's Guide to the Internet of Things
- Evolution and Opportunity
- Your Company's IoT Strategy
- Business models on IoT
 - IoT Integration into Business Processes
 - Adopting IoT technology to streamline corporate processes
- Summary of telco operator strategies (indicative list)
- Building IoT Products and solutions

Entry Requirements

Successful completion of IoT – Technologies and Applications, 2 day course and/or equivalent knowledge/experience.

Target Group

Product Marketing Engineers, Network Design Engineers, Product Managers

Mode of Delivery

Instructor-led training with theory and practical examples.

Duration

1 day

Participants

The maximum number of participants is 12.

Language

English

Cloud and Virtualization Principles - *Live Virtual*

Course Objectives

This course explores the Cloud and Virtualization reference architecture, covering the compute, networking and storage hardware, virtualization and hypervisor software, virtual infrastructure lifecycle management and tenant management.

Contents

- Virtualization concepts - Hypervisors
- Virtualization benefits
- Cloud computing and its benefits
- Essential characteristics of the Cloud
- Cloud computing service models
- Cloud computing deployment models
- The relevance of Network Functions Virtualization (NFV) and Software Defined Networking (SDN) in relation to cloud
- The role of cloud computing in Telecom industry
- The NFVI model
- OpenStack architecture
- Services provided by OpenStack for virtual infrastructure management such as compute, storage and networking
- Cloud Orchestration
- Virtual Infrastructure Manager (VIM)

Entry Requirements

General Telecom networks and IT services knowledge and/or working experience.

Target Group

Managers and Engineers wishing to be familiar with the Cloud and Virtualization Principles

Mode of Delivery

Live virtual training.

Duration

2 sessions, 3 hours each

Participants

The maximum number of participants is 8.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Session	Topics	Estimated Time (hours)
1	Cloud & Virtualization	3
2	NFVI Architecture and Openstack Solution	3

Cloud and Virtualization

Course Objectives

This course explores the Cloud and Virtualization reference architecture, covering compute, networking and storage hardware, virtualization and hypervisor software, virtual infrastructure lifecycle management and tenant management. In addition, it elaborates on the cloud security threats and ways to mitigate them. Finally, the SDN concepts for networking are covered.

Contents

- Virtualization concepts - Hypervisors
- Virtualization benefits
- Cloud computing and its benefits
- Essential characteristics of the Cloud
- Cloud computing service models
- Cloud computing deployment models
- The relevance of Network Functions Virtualization (NFV) and Software Defined Networking (SDN) in relation to cloud
- The role of cloud computing in Telecom industry
- Cloud security concept
- Security responsibility model
- Security risks and major threats in cloud
- The NFVI model
- Openstack architecture
- Services provided by Openstack for virtual infrastructure management such as compute, storage and networking
- Cloud Orchestration
- Virtual Infrastructure Manager (VIM)
- SDN Solution Overview and benefits
- OpenFlow, OpenDaylight Overview

Entry Requirements

General Telecom networks and IT services knowledge and/or working experience.

Target Group

Managers and Engineers wishing to be familiar with the Cloud and Virtualization Principles.

Mode of Delivery

Instructor-led training, theory.

Duration

2 days

Participants

The maximum number of participants is 12.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Day	Topics	Estimated Time (hours)
1	Cloud & Virtualization	3
	Cloud Security	1
	NFVI Architecture	2
2	Openstack Solution	3
	Openstack Cloud Solution services	2
	SDN Overview	1

Containerization and Virtualization Principles

Course Objectives

This course introduces the core concepts, tools, and practices of virtualization and containerization, focusing on how they differ, complement each other, and power modern development and deployment pipelines.

Students will explore how virtualization enables efficient hardware resource management through virtual machines, while containerization offers lightweight, portable environments for application deployment.

This course lays the foundation necessary for more advanced learning in cloud computing, DevOps, and system design, enabling students to choose the right tools for the right problems in real-world environments.

Contents

The course:

- Introduces foundational concepts of virtualization and containerization in modern IT environments.
- Aims to equip learners with the ability to differentiate between virtual machines and containers.
- Provides an understanding of how virtualization abstracts hardware resources using hypervisors.
- Explains how containerization enables lightweight, portable, and scalable application deployment.
- Covers key tools and technologies, including VMware, Openstack, Docker and Kubernetes.
- Prepares learners for roles in DevOps, cloud infrastructure, and application deployment pipelines.
- Serves as a steppingstone for deeper learning in cloud computing, orchestration, and CI/CD.

Entry Requirements

General Telecom networks and IT services knowledge and/or working experience

Target Group

Managers and Engineers wishing to be familiar with the containerization and Virtualization Principles

Mode of Delivery

Lectures supported by practical demonstrations by the instructor

Duration: 2 days

Language: English

Participants: The maximum number of participants for this course is 12

OpenStack & Kubernetes (K8s) Introduction, Configuration and Administration

Course Objectives

This course has been designed for professionals seeking to develop a solid understanding of OpenStack, K8s and their core services, monitoring, logging and troubleshooting principles.

It consists of two parts: the OpenStack module and the K8s one.

The Openstack part aims at providing with a complete experience with administering and operating the most common OpenStack components to implement Infrastructure as a Service (IaaS) in a cloud, from image management to instance creation to network plugins and more. The hands-on part covers managing users, projects, flavors, roles, images, networking, and block storage.

In Kubernetes module attendees learn how to install and configure a production-grade Kubernetes cluster, from network configuration to upgrades to making deployments available via services. In the hands-on part they use the K8s key principles, such as pods, deployments, replicaset, and services, and will give you enough information so that you can start using Kubernetes on their own.

Contents

1. OpenStack

- The ETSI Model
- Introduction to OpenStack
 - Architecture
 - Openstack services
 - The Dashboard vs CLI
- Keystone (Identity service): Authenticating with Keystone, managing tokens, RBAC policies, & the purpose of the Service Catalog. Manage projects, users, roles, and quotas.
- Glance (Image service): Creating & managing images, options to build an image.
- Neutron (Network service): Understand what networks OpenStack uses, such as, the management network. Neutron architecture, Neutron security groups, Virtual routers, virtual switches and more.
- Nova (Compute service): Using Nova to deploy virtual machine (VM) instances & control where the instances are deployed. Deploying instances with SSH keys for better security. Understanding the supported hypervisors. Lastly, implementing resource quotas.
- Heat (Orchestration service): Discusses Heat templates, their syntax, with practical examples of Heat templates.
- Cinder: Manage ephemeral and persistent block storage
- Swift: Manage object storage

- Hands on include:
 - Manage flavors, storage, project, users, networks, images
 - Launch and verify an instance.
 - Customizing an instance on deployment time
 - Instances deployment through the orchestration function (HEAT)

2. Kubernetes (K8s)

- Containers and Orchestration Concepts
- An Introduction to Kubernetes
- Kubernetes Architecture
- The Basics of Kubernetes APIs, kubelet and K8s objects
- Managing State with Deployments
- Deployments vs statefulset vs daemonset
- Kubernetes Networking and CNIs
- Storage and CSIs
- Helm and Helm Charts
- Hands on Include:
 - Creation of YAML files
 - Create, verify and delete pods
 - Using Label Selector
 - Use Deployments, statefulset or daemonset for Pod manipulation
 - Create, verify and delete replica sets
 - Enabling Pod Limit Resources
 - Scale UP and Down
 - Use labs CNIs for networking

Entry Requirements

Linux administration, IT services knowledge and/or working experience.

Target Group

Linux system administrators, cloud administrators and cloud operations personnel

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 5 days

Language: Lectures in Greek and/or English, course material in English

Participants: The maximum number of participants for this course is 8

Time Plan

The following time plan is indicative, exact time required per topic always depends on the needs and prior knowledge of the attendees.

Day	Topics	Estimated Time (hours)
1	Introduction and Openstack services, GUI and CLI interfaces	1
	Manage images, flavors, and networks	1
	Manage projects, users, roles, and quotas	1
	Practicals	3
2	Manage ephemeral and persistent block storage	2
	Orchestration	1
	Practicals	3
3	Introduction to K8s, architecture, K8s Objects, Pod Deployment	2
	YAML	1
	Practicals	3
4	K8s Networking	2
	Deployments, statefulset or daemonset	1
	Practicals	3
5	Helm and Helm charts	1
	K8s Storage	1
	Resource limit	1
	Practicals	3

Artificial intelligence (AI) Basic Concepts - *Live Virtual*

Course description

Are you curious what Artificial intelligence (AI) really means? Are you thinking about the kind of impact AI might have on your job or life? Do you want to understand how AI will develop and affect us in the coming years and its Applications? Artificial intelligence (AI) is the general study of making intelligent machines. Machine learning (ML), a subset of AI, focuses on the ability of machines to receive data and learn for themselves without being programmed with rules.

This course provides an overview and insight of Artificial intelligence (AI), standards, technologies and applications. The participants will start building a basic understanding of AI and Machine learning (ML), information and examples about ML terminology and industries that are being transformed by AI.

Contents

- What is AI?
- Solving Problems with AI
- Machine Learning
- Neural Networks
- Examples of where AI is being applied

Entry Requirements

Basic knowledge on Networking.

Target Group

Anyone interested to learn about new technologies.

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours.

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	AI concept overview	1
	Machine Learning and Neural Networks overview	1
	AI use cases	1

Introduction to Artificial intelligence (AI) and its Applications

Course Objectives

Are you curious what Artificial intelligence (AI) really means? Are you thinking about the kind of impact AI might have on your job or life? Do you want to understand how AI will develop and affect us in the coming years and its Applications? Artificial intelligence (AI) is the general study of making intelligent machines. Machine learning (ML), a subset of AI, focuses on the ability of machines to receive data and learn for themselves without being programmed with rules.

This course provides an overview and insight of Artificial intelligence (AI), standards, technologies and applications. The participants will start building a basic understanding of AI and Machine learning (ML), information and examples about ML terminology and industries that are being transformed by AI.

Contents

- What is AI?
- Solving Problems with AI
- Machine Learning
- Neural Networks
- Examples of where AI is being applied

Entry Requirements

Basic knowledge on Networking.

Target Group

Anyone interested to learn about new technologies.

Mode of Delivery

Instructor-led training, theory.

Duration

1 day

Participants

The maximum number of participants is 12.

Language

English

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics	Estimated Time (hours)
1	Explain the concept of AI	2.5
	Describe the Machine Learning and the Neural Networks	2.5
	List the AI use cases	1.0

Boost Your Productivity with Generative AI chat tools

Course Overview

This course provides executives/employees with a comprehensive introduction to the principles and practices of prompt engineering, a crucial skill for enhancing efficiency and accuracy in day-to-day business workflow. Through hands-on exercises and real-world examples, participants will learn to craft precise and effective prompts that maximize the utility of AI in their daily tasks.

Course Objectives

By the end of this course, participants will:

- Understand the fundamentals of prompt engineering and its relevance to day-to-day business
- Gain proficiency in designing and refining prompts to elicit accurate and relevant responses from AI tools
- Learn to apply prompt engineering techniques to various business scenarios, including research, document drafting, and client communication
- Develop strategies for troubleshooting and improving AI interactions

Course Outline

Chapter 1: Introduction to Prompt Engineering

- Overview of AI and its applications in the business workplace
- Understanding prompt engineering: Definitions and key concepts
- The importance of precise prompts in business communication and research
- Practical exercises: Creating prompts for client communication

Chapter 2: Crafting Effective Prompts

- Components of a well-structured prompt
- Techniques for refining and optimizing prompts
- Practical exercises: Creating prompts for business research and documentation
- Common pitfalls and how to avoid them

Chapter 3: Advanced Applications and Troubleshooting

- Using prompts for complex scenarios
- Customizing prompts for different AI tools
- Troubleshooting: Identifying and correcting prompt issues
- Interactive session: Participants develop and test their own prompts with feedback

Entry Requirements

No prior experience with AI or prompt engineering is required. Basic familiarity with business research and documentation is recommended. Good command of English language is mandatory.

Target Group

This course is designed for business professionals and office employees who wish to enhance their AI user skills and leverage AI tools for improved productivity and accuracy in their work.

Mode of Delivery

Instructor-led training, with emphasis on practical exercises in ChatGPT and/or Copilot

Duration

One day

Participants

Due to its highly practical nature, the maximum number of participants is 8.

Language

English or Greek

Introduction to Big Data and Data Analytics for Business

Course Overview

This introductory course demystifies Big Data and analytics concepts, explaining how large volumes of structured and unstructured data can be harnessed to generate business value. It covers data collection, storage technologies, analytics techniques, and real-world applications in supply chain, production, and customer insights.

Participants will also explore data privacy and governance considerations to ensure responsible data usage.

Learning Objectives

- Understand Big Data characteristics and technologies
- Learn basics of data storage, processing, and analytics
- Explore business use cases for Big Data in manufacturing and supply chain
- Learn about data privacy, security, and governance
- Understand data visualization and decision support

Course Outline

- What is Big Data? Volume, Variety, Velocity
- Data Storage and Processing Technologies (Overview)
- Data Analytics Techniques and Tools
- Business Applications in Manufacturing and Supply Chain
- Data Privacy and Governance Fundamentals
- Data Visualization and Reporting
- Case Studies and Future Trends

Expected Outcomes

Attendees will be able to understand Big Data's potential and identify opportunities to leverage data analytics in their business functions.

Target Group

Business professionals, analysts, and IT newcomers interested in data-driven decision-making.

Mode of Delivery

Instructor-led training including theory lectures, practical examples and open Q&A sessions.

Duration: 2 days

Language: English

Participants: The maximum number of participants for this course is 12

Artificial Intelligence Essentials: What Every Business Leader Should Know

Course Overview

This awareness course is designed to provide business leaders with a clear understanding of Artificial Intelligence (AI) fundamentals without technical complexity. It covers AI types, practical applications across industries, ethical considerations, and how AI can drive innovation and operational improvement.

The course aims to empower leaders to make informed decisions about adopting AI and to foster a culture of innovation.

Learning Objectives

- Understand AI concepts and categories (Narrow, General, etc.)
- Learn about AI applications relevant to manufacturing and services
- Explore AI-driven business transformation and innovation
- Discuss ethical AI use and societal impact
- Identify strategic opportunities for AI adoption

Course Outline

- AI Fundamentals: Definitions and Types
- Real-world AI Applications Across Industries
- AI in Manufacturing, Supply Chain, and Customer Experience
- Ethics, Bias, and Responsible AI
- Explainability and Trustworthiness
- Innovation with AI: Strategic Considerations
- Case Studies and Future Outlook

Expected Outcomes

Participants will gain confidence to engage in AI strategy discussions and champion AI initiatives in their organizations.

Target Group

Executives, managers, and business professionals interested in AI's role in their organization.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2 days

Language: English

Participants: The maximum number of participants for this course is 12

AI-Powered Document Automation

Course Overview

This practical course explores how Artificial Intelligence (AI) technologies can automate the processing of diverse business documents such as invoices, purchase orders, and delivery notes. Large companies handle thousands of documents monthly, often with varying formats, including handwritten or low-quality scans. Automating these tasks reduces manual effort, improves accuracy, and accelerates workflows.

Participants will gain hands-on experience in applying AI models — including Optical Character Recognition (OCR), Natural Language Processing (NLP), and machine learning — to extract, classify, and validate information from documents. The course also addresses integration strategies with existing Enterprise Resource Planning (ERP) systems, ensuring smooth end-to-end automation.

Learning Objectives

- Understand the challenges of document processing in modern enterprises
- Learn key AI technologies used in document automation (OCR, NLP, ML)
- Explore methods for handling complex or low-quality documents
- Design workflows for automated data extraction and validation
- Integrate AI-based document automation with ERP systems (conceptual overview)
- Analyze case studies of successful implementations in manufacturing and logistics

Course Outline:

- Introduction to Document Automation and AI
- Overview of OCR and NLP Technologies
- Extracting Features from Document Images
- Handling Document Variability and Quality Issues
- Machine Learning Models for Data Extraction
- Integration with ERP and Workflow Systems
- Hands-on Exercises Using AI Tools (Platform agnostic)
- Case Studies and Best Practices
- Future Trends and Ethical Considerations

Expected Outcomes:

By the end of this course, participants will be equipped to lead or support AI-driven document automation initiatives, improving operational efficiency and data accuracy.

Duration: 2–3 days

Target Group

IT professionals, business analysts, operations managers, and anyone involved in document management or process automation.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2-3 days

Language: English

Participants: The maximum number of participants for this course is 12

Developing Conversational AI Chatbots

Course Overview

This course introduces the design and development of AI-powered chatbots for business applications. Chatbots enhance customer service, streamline internal support, and improve user engagement by providing conversational interfaces that understand natural language.

Participants will explore various chatbot architectures, technologies, and deployment options without focusing on a specific vendor. The course covers dialogue design, safety and compliance considerations, and techniques for analyzing user interactions to continuously improve chatbot performance.

Learning Objectives

- Understand chatbot use cases and business benefits
- Understand how LLMs work
- Gain an overview about Transformers
- Learn about natural language understanding and generation
- Explore chatbot design principles and conversation flow modeling
- Address content moderation and ethical AI use
- Learn methods to anonymize and analyze chatbot interactions
- Plan chatbot integration into websites, mobile apps, or enterprise systems

Course Outline

- Introduction to Conversational AI
- Large Language Models and Fine-Tuning
- Chatbot Types and Architectures
- Designing Effective Conversation Flows
- AI Safety and Content Moderation
- Analytics and Performance Monitoring
- Deployment and Integration Strategies
- Case Studies from Industry and Retail

Expected Outcomes: Participants will be able to conceptualize, design, and contribute to chatbot projects that improve communication efficiency and customer satisfaction.

Target Group

Developers, IT staff, product managers, and customer experience professionals interested in conversational AI.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2-3 days

Language: English

Participants: The maximum number of participants for this course is 12

Robotic Process Automation (RPA) and Industrial Automation

Course Overview

This course covers the fundamentals of Robotic Process Automation (RPA) and its application in manufacturing environments. It includes a focus on robotic palletizing systems and integration with industrial control systems such as Programmable Logic Controllers (PLCs).

Participants will understand how RPA complements traditional automation, learn programming basics for industrial robots, and explore methods for integrating robotics into production lines to boost efficiency and reduce errors.

Learning Objectives

- Understand differences between RPA and industrial robotics
- Learn fundamentals of robotic arm programming and control
- Explore PLC programming and integration with automation systems
- Analyze case studies in manufacturing
- Explore safety standards and compliance for robotics
- Understand future trends in Industry 4.0 and automation

Course Outline

- Introduction to RPA and Industrial Automation
- Robotic Arms: Architecture and Programming Basics
- PLCs and Industrial Control Systems
- Designing Robotic Palletizing Solutions
- Integration and Workflow Automation
- Safety and Compliance
- Hands-on Exercises and Simulation
- Industry 4.0 Overview and Case Studies

Expected Outcomes

Attendees will understand how to design and implement robotic automation projects that optimize manufacturing processes.

Target Group

Manufacturing engineers, automation specialists, IT staff, and operations managers.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2-3 days

Language: English

Participants: The maximum number of participants for this course is 12

Next-Gen ICT Security: Architectures, Threats & Countermeasures

Course Outline

Advanced ICT Security Technical Foundation is a 4-5 day intensive technical training program designed to equip ICT professionals with in-depth knowledge and practical skills in cybersecurity. The course covers core and cutting-edge security technologies, cyber threat intelligence, attack methodologies, secure infrastructure design, monitoring, incident response, and governance frameworks. It emphasizes real-world scenarios and hands-on activities for advanced competency in protecting complex ICT environments.

Objective

- By the end of this course, participants will be able to:
- Understand advanced cybersecurity concepts and architectures across ICT systems.
- Identify and analyze complex cyber threats and vulnerabilities.
- Design and implement secure ICT infrastructure using modern best practices.
- Apply tools and techniques for detection, response, and mitigation of cyber attacks.
- Evaluate and integrate international standards and frameworks (e.g., NIST, ISO/IEC 27001, MITRE ATT&CK).
- Leverage emerging technologies (e.g., Zero Trust, AI/ML, SOAR) for enhanced security postures.

Contents

Session 1: Cybersecurity Landscape and Frameworks

- Evolving threat landscape and attacker tactics, techniques, and procedures (TTPs)
- Cybersecurity principles (CIA triad, Zero Trust, defense in depth)
- Global frameworks and compliance standards: NIST CSF, ISO/IEC 27001, CIS Controls
- Risk management lifecycle and threat modeling (STRIDE, DREAD)
- Case Study: SolarWinds Attack (2020) – Understanding the risk of compromised supply chains and third-party software vulnerabilities

Session 2: Secure Infrastructure Design and Network Defense

- Security architecture for modern ICT infrastructures (cloud, on-prem, hybrid)
- Network segmentation, secure configurations, VPNs, NAC, and firewalls
- Advanced IDS/IPS systems and network monitoring techniques
- Secure protocols (TLS, SSH, IPsec) and encryption best practices
- Case Study: Colonial Pipeline Ransomware Attack (2021) – Analyzing the consequences of infrastructure vulnerabilities and weak network segmentation

Session 3: Endpoint, Identity, and Application Security

- Hardening operating systems and endpoint protection strategies
- IAM, MFA, and modern identity federation (OAuth, SAML, OpenID)
- Secure software development (DevSecOps, CI/CD pipeline risks)
- Web and API security (OWASP Top 10, API security testing tools)

- Case Study: Okta and GitHub Token Abuse (2022) – Identity provider attack and source code access breach through compromised personal tokens

Session 4: Threat Detection, SIEM, and Incident Response

- Cybersecurity operations and Security Information & Event Management (SIEM)
- Threat hunting, anomaly detection, and incident response workflows
- Forensic analysis basics and malware reverse engineering overview
- Hands-on Lab: Investigating a breach using ELK Stack or Splunk
- Case Study: Uber Data Breach (2022) – Compromised credentials and privilege escalation leading to major data exposure

Session 5: Cybersecurity in Emerging Technologies

- Security in virtualized and containerized environments (Docker, Kubernetes)
- Cloud security (AWS, Azure, GCP – shared responsibility model)
- IoT and 5G security challenges and threat vectors
- AI/ML in cybersecurity: detection, automation, and adversarial attacks
- Case Study: Tesla Kubernetes Dashboard Leak (2018) – Misconfigured cloud container infrastructure and cryptojacking

Session 6: Strategy, Governance, and Future Trends

- Building a cyber-resilient ICT organization
- Aligning cybersecurity with business and regulatory needs
- Preparing for post-quantum cryptography
- Group Exercise: Designing a cybersecurity improvement roadmap
- Case Study: Equifax Data Breach (2017) – Strategic governance and compliance failures in patch management and risk oversight

Assessment and Certification

Participants will receive a certificate of completion.

Optional: Practical skills evaluation or final quiz at the end of Day 5.

Entry Requirements

Solid understanding of ICT systems and network fundamentals

Experience with IT infrastructure, software, or system administration

Familiarity with common networking protocols and basic security practices

Target Group:

ICT professionals, system/network engineers, infrastructure architects, or cybersecurity-focused roles seeking to deepen their security expertise.

Mode of Delivery:

Instructor-led learning (virtual classroom or onsite), including live demonstrations, interactive labs, and group activities.

Duration:

4-5 Days (suggested format: 5 days for full coverage including extended hands-on sessions)

Language: English

Maximum Number of Participants: 12

Sustainable IT Practices and ESG Integration

Course Overview

This training introduces participants to sustainable IT practices and how digital transformation can support Environmental, Social, and Governance (ESG) goals. The course covers frameworks for measuring and reporting ESG performance, scenario planning, and developing tools to align IT strategies with sustainability commitments.

Drawing from modern organizations' sustainability focus, participants will learn how IT systems can track carbon footprint, resource use, and social impact, contributing to transparent reporting and strategic decision-making.

Learning Objectives

- Understand ESG concepts and their relevance to IT
- Learn IT strategies to support sustainability goals
- Explore tools for ESG data collection and reporting
- Design IT solutions that promote resource efficiency
- Understand regulatory requirements and standards
- Analyze case studies from the industry

Course Outline

- Introduction to ESG and Sustainable IT
- Measuring and Reporting ESG Performance
- IT Tools for Carbon and Resource Tracking
- Scenario Planning for Sustainable Business
- Regulatory and Compliance Landscape
- Case Studies: Industry Leaders
- Developing an ESG-aligned IT Strategy

Expected Outcomes

Participants will gain practical knowledge to embed sustainability in IT operations and contribute to their organization's ESG objectives.

Target Group

IT managers, sustainability officers, business analysts, and compliance professionals.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2-3 days

Language: English

Participants: The maximum number of participants for this course is 12

SQL scripting

Course Objectives

This course covers the basics of SQL scripting regardless of the database infrastructure.

Contents

1. RDBMS & SQL Introduction
 - 1.1 General RDBMS Concepts
 - 1.2 SQL Introduction
2. Data Definition Language
 - 2.1 Create Table
 - 2.2 Column Data Types
 - 2.3 Primary and Foreign Key Constraints
 - 2.4 Database Schema Design
3. Data Manipulation Language
 - 3.1 Insert – Update - Delete
 - 3.2 Transactions
4. Retrieving Data
 - 4.1 Select Command Introduction
 - 4.2 Limiting and Combining Columns
 - 4.3 Inline Functions
 - 4.4 Limiting Rows
5. Combining Data
 - 5.1 Join types
 - 5.2 Union
 - 5.3 Subqueries
6. Data Aggregation
 - 6.1 Group by Concept
 - 6.2 Multiple Row Functions
 - 6.3 Having vs Where
7. SQL in Analytics
 - 7.1 Normalization and de-Normalization
 - 7.2 Big Data
 - 7.3 SQL in Various Platforms

Entry Requirements

Basic IT concepts understanding preferably with hands-on background is required from the participants.

Target Group

Technical personnel involved in retrieving data using SQL

Mode of Delivery: Distance-instructor-led learning in a virtual classroom

Duration: The duration of this course is 3 full training days

Language: English

Participants: The maximum number of participants for this course is 12 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Course Structure		Hours	Days
RDBMS & SQL Introduction	General RDBMS Concepts	1	Day 1
	SQL Introduction		
Data Definition Language	Create Table	2	
	Column Data Types		
	Primary and Foreign Key Constraints		
	Database Schema Design		
Data Manipulation Language	Insert – Update - Delete	3	
	Transactions		Day 2
Retrieving Data	Select Command Introduction	2	
	Limiting and Combining Columns		
	Inline Functions		
	Limiting Rows	1	
Combining Data	Join types	2	
	Union		
	Subqueries	1	Day 3
Data Aggregation	Group by Concept	2	
	Multiple Row Functions		
	Having vs Where	1	
SQL in Analytics	Normalization and de-Normalization	1	
	Big Data	1	
	SQL in Various Platforms	1	

Relational Database Management System (RDBMS) Administration

Course Objectives

This course covers the essential RDBMS Administration concepts and applications in order to ensure that a Database Server will cover all its tasks in a fast, reliable and secure manner with minimum response times, data loss and security issues.

Contents

1. RDBMS Basic Concepts
 - 1.1 Introduction
 - 1.2 Job roles involved
2. Installing an RDBMS
 - 2.1 System pre requirements
 - 2.2 Storage plan
 - 2.3 Setting up the software
 - 2.4 Creating separate databases
3. Security Management
 - 3.1 Creating users and groups
 - 3.2 Limiting user storage quota-privileges
 - 3.3 Limiting user resources consumption
4. Backup
 - 4.1 Database operating modes
 - 4.2 Backup types
5. Recovery
 - 5.1 Recovery methods
 - 5.2 Minimizing time to recover
6. Performance Tuning Concepts
 - 6.1 Introduction
 - 6.2 Factors influencing performance
7. Indexes
 - 7.1 Index types
 - 7.2 SQL optimizer
 - 7.3 Explain plan
8. Optimizing Performance

8.1 Best practices

Entry Requirements

Basic IT and Database-SQL concepts understanding preferably with hands-on background is required from the participants.

Target Group

Technical personnel involved in administering a RDBMS

Mode of Delivery: Live, instructor lead learning in a physical or virtual classroom

Duration: The duration of this course is 3 full training days

Language: English

Participants: The maximum number of participants for this course is 12 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Course Structure		Hours	Days
RDBMS Basic Concepts	Introduction	1	Day 1
	Job roles involved		
Installing an RDBMS	System pre requirements	3	
	Storage plan		
	Setting up the software		
	Creating separate databases		
Security Management	Creating users and groups	2	
	Limiting user storage quota-privileges		
	Limiting user resources consumption		
Backup	Database operating modes	1	Day 2
	Backup types	2	
Recovery	Recovery methods	1	
	Minimizing time to recover	2	
Performance Tuning Concepts	Introduction	1	Day 3
	Factors influencing performance	1	
Indexes	Index types	1	
	SQL optimizer	1	
	Explain plan	1	
Optimizing Performance	Best practices	1	

PL/SQL programming

Course Objectives

This course covers PL/SQL scripting used in the Oracle RDBMS.

Contents

- 1. PL/SQL Introduction
 - 1.1 General PL/SQL Concepts
 - 1.2 Programming Units Introduction
- 2. Language Basics
 - 2.1 Variable Types
 - 2.2 Blocks
 - 2.3 Scope
- 3. Control Structures
 - 3.1 Conditions
 - 3.2 Iterations
- 4. Cursors
 - 4.1 Implicit-Explicit
 - 4.2 Parameters
 - 4.3 Access Methods
- 5. Programming Units
 - 5.1 Functions and Procedures
 - 5.2 Creation Options
 - 5.3 Call by Value – Reference
 - 5.4 Transaction Scope
 - 5.5 Dynamic SQL
- 6. Packages
 - 6.1 Specification – Body
 - 6.2 Dependencies
 - 6.3 Definer vs Invoker
 - 6.4 Exceptions
- 7. Triggers
 - 7.1 Trigger Types
 - 7.2 Trigger Actions
- 8. Package Libraries
 - 8.1 Libraries Overview

Entry Requirements

IT concepts understanding with hands-on background is required from the participants.

Target Group

Technical personnel involved in programming using PL/SQL.

Mode of Delivery: Distance-instructor-led learning in a virtual classroom

Duration: The duration of this course is 3 full training days

Language: English

Participants: The maximum number of participants for this course is 10 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Course Structure		Hours	Days
PL/SQL Introduction	General PL/SQL Concepts	2	Day 1
	Programming Units Introduction		
Language Basics	Variable Types	1	
	Blocks	1	
	Scope		
Control Structures	Conditions	1	
	Iterations	1	
Cursors	Implicit-Explicit	2	Day 2
	Parameters		
	Access Methods	1	
Programming Units	Functions and Procedures	2	
	Creation Options		
	Call by Value – Reference		
	Transaction Scope	1	
	Dynamic SQL		Day 3
Packages	Specification – Body	2	
	Dependencies		
	Definer vs Invoker		
	Exceptions	1	
Triggers	Trigger Types	2	
	Trigger Actions		
Package Libraries	Libraries Overview	1	

Very Large Data in Spreadsheets

Course Description

This course covers the extraction, transformation and loading of very large datasets in Spreadsheet along with the various spreadsheet reporting capabilities.

Contents

- 1. Very Large Data Introduction
 - 1.1 VLDB Concepts
 - 1.2 Spreadsheet limitations
- 2. Extraction
 - 2.1 Power Query Introduction
 - 2.2 Data Sources
 - 2.3 Big Data
- 3. Transformation
 - 3.1 Apply Steps
 - 3.2 Limiting Columns-Rows
 - 3.3 Merge-Split Columns
 - 3.4 Replace-Change Values
- 4. Combining Data
 - 4.1 Merge vs Append
 - 4.2 Multiple Queries
- 5. Loading
 - 5.1 Power Pivot Tables Concepts
 - 5.2 Spreadsheet Model
- 6. Data Aggregation
 - 6.1 DAX Functions
 - 6.2 Column vs Measure
- 7. Reporting
 - 7.1 Pivot Tables
 - 7.2 Pivot Charts

Entry Requirements

Basic IT concepts understanding preferably with hands-on background is required from the participants.

Target Group

Technical personnel in a Mobile Network Operator involved in retrieving and examining very large datasets using spreadsheets.

Mode of Delivery: Instructor-led learning onsite or in a virtual classroom

Duration: The duration of this course is 3 full training days

Language: English

Participants: The maximum number of participants for this course is 12 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Course Structure		Hours	Days
Very Large Data Introduction	VLDB Concepts	1	Day 1
	Spreadsheet limitations		
Extraction	Power Query Introduction	2	
	Data Sources		
	Big Data		
Transformation	Apply Steps	3	
	Limiting Columns-Rows		
	Merge-Split Columns		
	Replace-Change Values		Day 2
Combining Data	Merge vs Append	2	
	Multiple Queries	1	
Loading	Power Pivot Tables Concepts	1	
	Spreadsheet Model	2	Day 3
Data Aggregation	DAX Functions	2	
	Column vs Measure	1	
Reporting	Pivot Tables	2	
	Pivot Charts	1	

BI Designing and Reporting

Course Objectives

This course covers the Business Intelligence design and reporting concepts and applications using spreadsheets.

Contents

- 1. Business Intelligence Concepts
 - 1.1 Introduction
 - 1.2 BI system features
- 2. BI Database Design
 - 2.1 Normalization vs de normalization
 - 2.2 Star schema design
- 3. Extraction
 - 3.1 Data Sources
 - 3.2 Database - CSV Files - Folders
- 4. Transformation
 - 4.1 Apply Steps
 - 4.2 Limiting Columns-Rows
 - 4.3 Merge-Split Columns
 - 4.4 Replace-Change Values
- 5. Combining Data
 - 5.1 Merge vs Append
 - 5.2 Multiple Queries
- 6. Loading
 - 6.1 Power Pivot Tables Concepts
 - 6.1 Excel Model
- 7. Data Aggregation
 - 7.1 DAX Functions
 - 7.2 Column vs Measure
- 8. Reporting
 - 8.1 Pivot Tables
 - 8.2 Pivot Charts
- 9. Power BI
 - 9.1 Power BI Concepts

Entry Requirements

Basic IT and Database concepts understanding preferably with hands-on background is required from the participants.

Target Group

Technical personnel involved in performing Business Intelligence using spreadsheets

Mode of Delivery: Live, instructor lead learning in a physical or virtual classroom

Duration: The duration of this course is 3 full training days

Language: English

Participants: The maximum number of participants for this course is 12 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Course Structure		Hours	Days
Business Intelligence Concepts	Introduction	1	Day 1
	BI system features	1	
BI Database Design	Normalization vs de normalization	1	
	Star schema design		
Extraction	Data Sources	1	
	Database - CSV Files - Folders		
Transformation	Apply Steps	2	
	Limiting Columns-Rows		
	Merge-Split Columns		
	Replace-Change Values		
Combining Data	Merge vs Append	2	Day 2
	Multiple Queries	1	
Loading	Power Pivot Tables Concepts	1	
	Excel Model	2	
Data Aggregation	DAX Functions	2	Day 3
	Column vs Measure	1	
Reporting	Pivot Tables	1	
	Pivot Charts	1	
Power BI	Power BI Concepts	1	

Python & Data Analysis

Course Objective

This course covers the basics of Python language and its use for Data Analysis.

Contents

- 1. Python & Data Analysis
 - 1.1 Introduction to Python
 - 1.2 Data Analysis Concepts
- 2. Python Basics
 - 2.1 Variables & Operators
 - 2.2 Lists, Tuples, Dictionaries
- 3. Python Control Structures
 - 3.1 Conditions, Iterations
 - 3.2 Functions, Libraries
- 4. Python Objects
 - 4.1 Objects & Classes
 - 4.2 Constructors
 - 4.3 Inheritance, Polymorphism
- 5. Data Analysis Calculations
 - 5.1 Introduction to NumPy
 - 5.2 Arrays, Data Types, Attributes
 - 5.3 Maths
- 6. Data Analysis ETL
 - 6.1 Introduction to Pandas
 - 6.2 Reading Data
 - 6.3 Manipulating Data
- 7. Data Visualization
 - 7.1 Introduction to Matplotlib
 - 7.2 Plots
 - 7.3 Graphs

Entry Requirements

Basic IT concepts understanding preferably with hands-on background is required from the participants.

Target Group

Technical personnel involved in performing data analysis using Python.

Mode of Delivery: Live, instructor lead learning in a physical or virtual classroom

Duration: The duration of this course is 3 full training days

Language: Greek or English (Material in English)

Participants: The maximum number of participants for this course is 12 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Days	Course Structure		Hours
Day 1	Python & Data Analysis	Introduction to Python	1
		Data Analysis Concepts	
	Python Basics	Variables & Operators	2
		Lists, Tuples, Dictionaries	
	Python Control Structures	Conditions, Iterations	2
		Functions, Libraries	1
Day 2	Python Objects	Objects & Classes	2
		Constructors	
		Inheritance, Polymorphism	1
	Data Analysis Calculations	Introduction to NumPy	1
		Arrays, Data Types, Attributes, Maths	2
Day 3	Data Analysis ETL	Introduction to Pandas	1
		Reading Data	1
		Manipulating Data	1
	Data Visualization	Introduction to Matplotlib	1
		Plots	1
		Graphs	1

Continuous Integration/ Continuous Delivery (CI/CD)

Course Objectives

By the end of this course participants will have a fundamental grasp of the key concepts and the main building blocks of a CI/ CD ecosystem of tools that can be used to support an automated software delivery lifecycle. The course focuses on the presentation of the basic mechanics of specific generic, well-acknowledged and heavily industrially-used open-source tools. Through this focus and along with the referencing to theoretical concepts and best practices, the participants will finally feel comfortable with both the concepts and the realization of CI/CD practices.

Contents

Key Concepts

- Continuous Delivery
- Continuous Integration
- Continuous Deployment
- DevOps
- Agile Software Development
- Source Control
- Continuous Testing & QA
- Non-functional Testing
- Configuration Management
- Virtualization & Containerization

Stage 1: Software Development/ Configuration

- Integrated Development Environments
 - Case study - lab: Eclipse
- Common development/ configuration practices
 - Case studies: pair programming, test-driven development
- Code quality metrics
 - Case study - lab: SonarQube
- Unit tests
 - Case studies - labs: JUnit, NUnit
- Version control
 - Case studies - labs: GitHub, GitLab

Stage 2: Automated Acceptance Testing

- Generic test automation frameworks

- Case study - lab: Robot
- Integration tests
 - Case study - lab: Jenkins
- Feature-level tests
 - Case study - lab: Selenium

Stage 3: Pre-Production

- Release automation
 - Case study - lab: Jenkins
- Capacity and performance tests
 - Case study - lab: Gatling

Stage 4: Production deployment

- Containerization
 - Case study - lab: Docker
- Configuration management
 - Case study - lab: Chef

Entry Requirements

Experience on enterprise-level software systems development/ configuration and/or operation.

Target Group

IT professionals

Mode of Delivery

Instructor-led training. The course comprises lectures (accompanied with slides and source code) and practical hands-on examples on actual demonstration environment.

Duration

3 days

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge/ interests of the attending participants and the hours stated below can be used as an estimate.

Day	Topics in the course	Estimated Time (hours)
1	Key Concepts	2.0
	Integrated Development Environments	0.5
	Case study - lab: Eclipse	0.5
	Common development/ configuration practices	1.0
	Code quality metrics	0.5
	Case study - lab: SonarQube	0.5
	Unit tests	0.5
	Case studies - labs: JUnit, NUnit	0.5
2	Version Control	0.5
	Case study – lab: GitHub	1.0
	Case study – lab: GitLab	0.5
	Generic test automation frameworks	0.5
	Case study – lab: Robot	1.5
	Integration tests	0.5
	Case study - lab: Jenkins	1.5
3	Feature-level tests	0.5
	Case study - lab: Selenium	0.5
	Release automation	0.5
	Case study - lab: Jenkins	0.5
	Capacity and performance tests	0.5
	Case study - lab: Gatling	0.5
	Containerization	0.5
	Case study - lab: Docker	1.5
	Configuration management	0.5
	Case study - lab: Chef	0.5

Perl Programming

Course Objectives

By the end of this course participants will acquire broad knowledge of the Perl programming language. The syntactic characteristics of the language will be highlighted first. Practical examples and exercises will be used side by side with the presentation of the contents of the language. The purpose of using Perl along with the main traits that differentiates it from other languages will be pointed out. Particular focus will be given to advanced operations as well as the way of making value out of the comprehensive repository of tested modules that are freely available. In the end of the course all the participants are expected to be ready to read and develop advanced programs in Perl, feeling comfortable to work and deliver in a real production context.

Contents

- Introduction to Perl
- Starting with Perl

Data types

- Scalars
- Strings
- Numbers
- Arrays
- Hashes
- Nested data structures

Expressions

- Variables
- Operators
- References

Input/ Output

- Reading command line arguments
- Writing to standard output

Control flow

- Conditional expressions
- Looping statements
- Error handling

Regular expressions

- Building regular expressions
- Pattern matching

File management

- Reading files
- Writing files
- Directory manipulation

Components

- Packages
- Routines
- Modules
- CPAN

Database operations

- CRUD operations
- Transactions
- Stored procedures

Special topics

- Multi-threading
- Object-oriented programming with Perl
- CGI scripting
- Networking
- GUI with Perl
- Security and cryptography

Entry Requirements

Basic grasp of general programming concepts.

Target Group

Software Engineers

Mode of Delivery

Instructor-led training. The course comprises lectures (accompanied with slides and source code), quizzes and practical hands-on exercises on actual development environment. Realistic working small scale artifacts are expected to have been produced by the participants in the end of the course.

Duration: 5 days

Language: English

Participants: The maximum number of participants for this course is 8

Time schedule

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Day	Topics in the course	Estimated Time (hours)
1	Introduction to Perl	0.5
	Starting with Perl	0.5
	Scalars	0.5
	Strings	1
	Numbers	0.5
	Arrays	1
	Hashes	1
	Practice	1
2	Nested data structures	0.5
	Variables	0.5
	Operators	0.5
	References	1
	Reading command line arguments	0.5
	Writing to standard output	0.5
	Conditional expressions	0.5
	Looping statements	1
3	Practice	1
	Error handling	0.5
	Building regular expressions	1
	Pattern matching	0.5
	Reading files	1
	Writing files	1

	Directory manipulation	0.5
	Packages	0.5
	Practice	1
4	Routines	1.5
	Modules	1
	CPAN	0.5
	CRUD operations	1.5
	Transactions	0.5
	Practice	1
5	Stored procedures	0.5
	Multi-threading	0.5
	Object-oriented programming with Perl	1
	CGI scripting	1
	Networking	1
	GUIs with Perl	0.5
	Security and cryptography	0.5
	Practice wrap-up	1

Web Programming

Course Objectives

By the end of this course participants will acquire a good understanding of the HTML documents and how to style them through CSS. They will also be able to build dynamic web applications through the use of JavaScript and jQuery and to design their pages for all kinds of devices. Finally, they will know how to integrate advanced features like multimedia and location capabilities and to use the above technologies for building modern web applications.

Contents

- Hyper Text Transfer Protocol (HTTP) overview
- HTML Overview
- Styling documents with CSS
- Dynamic Web Applications with JavaScript, jQuery and JSON
- Responsive Web Design
- Advanced HTML5 topics

HTML Overview

- Basic HTML
- Text, Links and Images
- Lists and Tables
- Forms
- Frames and iFrames
- Validation

CSS Overview

- Introduction to CSS
- Structuring pages with CSS
- CSS3 basics

Javascript and jQuery

- Javascript Language
- Functions
- Objects
- Document Object Model

- JSON
- jQuery Selection
- jQuery Events
- jQuery Plugins

Responsive Web Design

- Designing for various Screen Resolutions
- Flexible Grids
- CSS3 Media Queries

Advanced HTML5 Topics

- Drag and Drop
- AJAX
- Multimedia
- Integrating Location and Maps
- jQuery Mobile overview

Entry Requirements

Basic programming skills, basic knowledge of web technologies

Target Group

Web Developers, Software Engineers

Mode of Delivery

Lectures and practical exercises

Duration: 5 days

Language: English

Participants: The maximum number of participants for this course is 8

Hadoop Operation Training

Course Objectives

By the end of this course participants will acquire broad knowledge of Hadoop framework concepts and usability. The components, purpose and various modules of Hadoop will be outlined first. Practical examples and exercises will be used side by side with the presentation of the contents of the framework. The purpose of deploying Hadoop along with the main traits that differentiates it from traditional approaches will be pointed out. Particular focus will be given to advanced operations as well as the way of making value out of the orchestration of the various modules and applications that run on Hadoop. In the end of the course all the participants are expected to be ready to setup, create, deploy and manage operations running on Hadoop.

Contents

Hadoop Installation and Deployment

- Components and architecture
- Installation and configuration basics
- Deployment types
- Hosting in the cloud
- Lab: Installation of Hadoop training environment

Hadoop Distributed File System (HDFS)

- Overview
- Architecture
- File storage
- Operations and commands

MapReduce

- Terminology
- Analysis of the algorithm
- Examples
- Design patterns
- Lab: Implementation and execution of a MapReduce execution scenario

Scheduling, administration and monitoring

- Scheduling approaches (FIFO, capacity, fair)
- YARN resource manager
- Resource manager high-availability
- Authentication and security

- Disaster recovery and backup practices
- Lab: Hands-on experimentation with scheduling and resource planning configurations

Apache HBase

- Architecture
- Data model
- Query language and API

Other applications running on Hadoop

- Apache Phoenix
- Apache Cassandra
- Apache Hive
- Apache Mahout

Entry Requirements

Basic Java programming knowledge, database concepts and Linux operating system usage.

Target Group

IT professionals

Mode of Delivery

Instructor-led training. The course comprises lectures (accompanied with slides and source code), quizzes and practical hands-on exercises on actual development environment. Realistic working small-scale artifacts are expected to have been produced by the participants in the end of the course.

Duration: 3 days

Language: English

Participants: The suggested number of participants for this course is 8

Time schedule

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as an estimate.

Day	Topics in the course	Estimated Time (hours)
1	Components and architecture of Hadoop	0.5

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	Installation and configuration basics	0.5
	Deployment types	0.5
	Hosting in the cloud	0.5
	Hadoop Distributed File System (HDFS)	1.5
	Lab: Installation of Hadoop training environment	2.5
2	MapReduce	1.5
	Lab: Implementation and execution of a MapReduce execution scenario	1
	Scheduling approaches in Hadoop	1
	YARN resource manager	1
	Lab: Hands-on experimentation with scheduling and resource planning configurations	1.5
3	High-availability	0.5
	Authentication and security	0.5
	Disaster recovery and backup practices	0.5
	Apache HBase	2.5
	Other applications running on Hadoop	2

FTTH Networks Design and Deployment

Course Objectives

This course will cover the fundamental principles, design, and deployment strategies of FTTH networks, with a focus on aerial deployment.

- Introduction to the course
- Fundamentals of Fiber Optics
- Overview of FTTH
- Passive Optical Network (PON) and Active Optical Network (AON)
- Key components: Optical Line Terminal (OLT), Optical Network Terminal (ONT), Splitters
- FTTH Design Principles
 - Network planning and layout
 - Splitter placement and ratios
 - Calculating optical link budgets
 - Best practices
- Introduction to Aerial Fiber Deployment
- Detailed Design and Planning
- Splicing and Connectorization
- Aerial Fiber Deployment Techniques
- Practical Considerations and Case Studies
 - Network Configuration and Management
 - OLT and ONT configuration
 - VLANs and Quality of Service (QoS) in FTTH networks
- Regulatory and Safety Considerations
- Future Trends in FTTH and Aerial Deployment
- Emerging technologies in fiber optics
- Advances in aerial deployment techniques and materials
- Future outlook for FTTH networks

Entry Requirements

Telecom Networks general knowledge and/or working experience.

Target Group

Network Design, Support Engineers and operations personnel involved in FTTH networks design and deployment.

Mode of Delivery

Instructor-led training including theory lectures, theory exercises and use cases.

Duration: 2-3 days

Language: Lectures in Greek and/or English, course material in English

Participants: The maximum number of participants for this course is 12

SD-WAN Solutions, Design and Deployment

Course Objectives

The course will cover the fundamental principles, architectures, and overall knowledge necessary for understanding and implementing SD-WAN solutions.

- Introduction to the course
- Definition and evolution of SD-WAN
- Traditional WAN vs. SD-WAN: Key differences
- Benefits of SD-WAN (Cost savings, performance, flexibility)
- Overview of SD-WAN architecture, Key components
- How SD-WAN works: Overlay and Underlay Networks
- Deployment models: On-premises, Cloud-based, and Hybrid
- Factors influencing the choice of deployment model
- Designing an SD-WAN network: Planning and considerations
- Network topology and segmentation
- Traffic engineering and path selection
- Case studies and design examples
- Quality of Service (QoS) and Traffic Management
- Security in SD-WAN
- Management and Monitoring
- Integration with Cloud Services
- WAN Optimization Techniques
- Emerging Trends and Technologies

Entry Requirements

Telecom IP Networks general knowledge and/or working experience.

Target Group

Network Design, Support Engineers and operations personnel involved in SD solutions design and deployment.

Mode of Delivery

Instructor-led training including theory lectures, theory exercises and use cases.

Duration: 2 days

Language: English

Participants: The maximum number of participants for this course is 12

VoLTE over IMS and Wi-Fi Calling – *Live Virtual*

Course Objectives

This course will offer to the participants the opportunity to understand a detailed insight into VoLTE over IMS from end2end perspective and an introduction to WiFi Calling. It explains the concept of the VoLTE architecture, VoLTE and CS voice coexistence, migration mechanisms (ICS, SRVCC) and deployment scenarios.

Contents

- VoLTE introduction
 - Mobile Telephony Evolution
 - VoLTE Concepts
- VoLTE network architecture
 - Network Architecture
 - Network Nodes
 - Network Functions
- IMS Centralized Services (ICS)
 - ICS Concepts
 - ICS deployment scenarios
- Single Radio Voice Call Continuity (SRVCC)
 - SRVCC Concept
 - SRVCC Signalling Flow
- Wi-Fi Calling
 - Wi-Fi Concept

Entry Requirements

Working experience with IMS networks.

Target Group

IMS Engineers.

Mode of Delivery

Live virtual training.

Duration

2 sessions, 6 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	VoLTE introduction	0.5
	VoLTE network architecture	1.0
	IMS Centralized Services (ICS)	1.5
2	Single Radio Voice Call Continuity (SRVCC)	2.0
	Wi-Fi Calling	1.0

SIP Principles – *Live Virtual*

Course Objectives

This course will offer to the participants the opportunity to be familiar with SIP (Session Initiation Protocol). After completion of this course, the participants will get a very good understanding of SIP principles, components, messages, and routing.

Contents

- SIP Introduction
- SIP Components
- SIP Messages
- Transactions and Dialogs
- SIP Headers
- SIP Message Routing
- Session Description Protocol (SDP)

Entry Requirements

Basic knowledge of VoIP.

Target Group

Engineers working with IMS, VoIP networks.

Mode of Delivery

Live virtual training.

Duration

1 session, 3 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	SIP Introduction, SIP Components	1
	SIP Messages, Transactions Dialogues and Headers	1
	SIP Message Routing, SDP	1

SIP Troubleshooting - *Live Virtual*

Course Objectives

This course provides a review of the basic IMS traffic cases focusing on SIP. It explains the SIP error responses. The participants will study SIP protocol traces and troubleshoot error cases in the IMS network.

Contents

- IMS basic traffic cases: Registration, IMS to IMS call and IMS to PSTN call
- SIP error responses
- SIP error cases analysis:
 - 423 Interval Too Brief
 - 484 Address Incomplete
 - 502 Bad Gateway
 - 488 Not Acceptable Here

Entry Requirements

Good knowledge of SIP protocol and IMS network.

Target Group

Engineers working with IMS networks.

Mode of Delivery

Live virtual training.

Duration

2 sessions, 6 hours.

Participants

The maximum number of participants for this course is 8.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	IMS basic traffic cases	3

2	SIP error case analysis	3
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IMS/SIP Technical Overview

Course Objectives

The course provides an overview of the IP Multimedia Subsystem (IMS). It explains the benefits, the network architecture and the solutions an operator can offer with IMS.

In addition, the course describes the SIP protocol. It explains the main SIP/IMS signaling cases and analyzes SIP signaling error examples in the IMS network.

Contents

- IMS introduction, benefits and solutions
- IMS network architecture, nodes and interfaces
- Session Initiation Protocol (SIP)
- SIP signaling cases (registration, calls)
- IMS errors

Entry Requirements

General Telecom understanding

Target Group

Managers and Engineers wishing to be familiar with the IMS network and the applications it offers.

Mode of Delivery

Instructor-led training, theory and case studies (traces)

Duration

2 days

Participants

The maximum number of participants is 12.

Language

English

Time Plan

The exact time required per topic always depends on the needs and prior knowledge of the attendees therefore the below plan can be used as estimate.

Day	Topics	Estimated Time (hours)
1	IMS Introduction	1.5
	IMS Network Architecture	2.5
	SIP Analysis	2.0
2	SIP Analysis continued, traffic Cases	3.0
	SIP Error Analysis in IMS	3.0

SIP Principles, Analysis and Troubleshooting

Course Objectives

This course will offer to the participants the opportunity to practice on SIP (Session Initiation Protocol) traces analysis and troubleshooting cases in a realistic simulated environment.

Contents

- SIP Principles
Description of the SIP protocol, the possible interfacing networks for SIP, the basic functions and capabilities of SIP, major protocols related to SIP, IMS and VoIP, routing and addressing schemes of SIP signaling
- SIP Cases
 - Wireshark as Diagnostic tool
 - SIP Registration
 - Registration Successful
 - Registration error
 - SIP to SIP call
 - Call between two registered UAs
 - SIP to External network (optional, if it can be applied, connectivity to Public Internet required with relevant ports not blocked by firewalls)
 - Call to external network (SIP)
 - Instant Messages
 - Instant message exchange between two UAs
 - SIP Redirect
 - Call to UA that redirects call to another UA
 - SIP Forking
 - Call to two registered UAs with the same account
 - Unregistered user
 - Call to unregistered user
 - SIP disconnect errors
 - 403 Forbidden
 - 404 Not Found
 - 480 Temporarily Unavailable
 - 484 Address Incomplete
 - 486 Busy Here
 - 488 Not Acceptable Here
 - 500 Server Internal Error
 - 503 Service Unavailable

Entry Requirements

General knowledge and working experience in IMS, VoIP, Mobile Core Networks.

Target Group

Support Engineers, Integration Engineers, Solution Architects

Mode of Delivery

Instructor-led training, theory and practical exercises based on SIP open source SW simulator: SIP Proxy on virtual environment, SIP Clients set-up on PCs/laptops and optionally Android mobile devices.

Duration

2 days

Participants

The maximum number of participants is 8.

Language

English

IMS Signalling – *Live Virtual*

Course Objectives

This course will offer to the participants the opportunity to understand a detailed insight into IMS concept, architecture, service and protocols.

The following protocols are described with reference to the relevant IETF and 3GPP specifications:

- ✓ Session Initiation Protocol (SIP)
- ✓ Session Description Protocol (SDP)
- ✓ Diameter protocol
- ✓ MeGaCo

Contents

- IMS introduction
 - IMS Overview and Benefits
 - IMS Services
- IMS History and Standardization
 - 3GPP releases
- IMS Network Architecture and Protocols
 - Layered Architecture
 - Nodes (CSCF, AS, HSS etc.)
 - Interfaces (Gm, Cx, ISC, etc.)
 - Protocols (SIP, SDP, Diameter, MeGaCo)
- IMS Basic Traffic cases
 - Registration
 - IMS to IMS call
 - Break out call

Entry Requirements

Knowledge and working experience with Telecom Networks.

Target Group

Planning Engineers, Support Engineers, Integration Engineers.

Mode of Delivery

Live virtual training.

Duration

2 sessions, 6 hours

Language

English

Participants

The maximum number of participants for this course is 8.

Time Plan

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate.

Session	Topics in the course	Estimated Time (hours)
1	IMS Introduction, history and Standardization	0.5
	IMS Architecture and Protocols	2.5
2	IMS Basic Traffic Cases	3.0

IMS (VoLTE) Advanced Signalling

Course Objectives

This course has been designed for professionals seeking to develop a solid understanding of IMS (IP Multimedia Subsystem) Networks and their supporting services.

The course provides a detailed introduction to signaling in IMS by presenting the protocols (SIP, SDP, Diameter and H248/MeGaCo) involved, different traffic cases from the IMS System. Provides also a detailed overview of VoLTE and Wi-Fi calling end2end use cases. It includes exercises with a thorough analysis of VoLTE traces taken on a live VoLTE/CS network: VoLTE registration, Session setup, SRVCC and IMS Centralized Services (ICS).

Contents

1. Describe the architecture of IMS the functions of the main logical nodes and the main IMS specifications and protocols.
2. Discuss the structure, specifications and usage of Session Initiation Protocol (SIP) and Session Description Protocol (SDP).
3. Recognize the structure, specifications and usage of the Diameter Protocol and of H.248 (MeGaCo)
4. Analyze detailed IMS signaling flows and Message content for registration, session establishment and other call scenarios.
5. Explain the Registration process, including Authentication.
6. Relate detailed SIP and SDP signaling flows and messages from traces.
7. Interpret detailed diameter signaling flows and message content for registration.
8. Review the basic concepts of VoLTE and its architecture.
9. Explain what VoLTE is, and its background.
10. Describe VoLTE attach and registration procedures.
11. Perform analysis of VoLTE attach and registration signaling captures.
12. Describe VoLTE session setup procedures.
13. Perform analysis of VoLTE session setup signaling captures
14. Describe SRVCC (Single Radio Voice Call Continuity) procedures.
15. Perform analysis of SRVCC signaling captures.
16. Describe ICS (IMS Centralized Services) procedures.
17. Perform analysis of ICS signaling captures.
18. Explain use cases in Wi-Fi Calling network.

Entry Requirements

Mobile Networks knowledge background and/or working experience.

Target Group

Core Network Support Engineers and operations personnel.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 3 days

Language: Lectures in Greek and/or English, course material in English

Participants: The maximum number of participants for this course is 12

Time Plan

The following time plan is indicative, exact time required per topic always depends on the needs and prior knowledge of the attendees.

Day	Topics	Estimated Time (hours)
1	IMS Network architecture	2
	SIP Analysis and identification of IMS signaling flows and procedures.	2
	Exercises	2
2	Review the basic concepts of VoLTE and its architecture.	1
	Explain basic VoLTE e2e use cases (Attach, Registration, Call establishment and Call termination)	2
	Exercises	3
3	Explain service specific use cases concerning SRVCC and ICS	2
	Wi-Fi Calling	1
	Exercises	3

RAN Introductory Course for New Employees

Course Objectives

This course offers a well-rounded presentation and discussion about the Telecom and RAN technologies from the past to the future. It examines on a high level, the entire spectrum of cellular telecommunications and their evolving throughout the Generations from GSM to NR. It is essential for people without or with limited working background in Radio Access Networks who wish to enhance their competence on RAN technologies.

Participants will have the opportunity to see the characteristics of the different Wireless Generations from 2G/GSM to 5G/NR and to discover the names and functionalities of the Core nodes from CS Core to EPC. The course, following the introduction chapters, describes the role of the nodes and gateways and consolidates the understanding with the examination of traffic flows.

The session concludes by discussing the latest technology trends, like Open and Virtual RAN.

Contents

1. Introduction
 - 1.1. RAN Generations Evolution
 - 1.2. Different services by different technologies
 - 1.3. End to End Network Architecture
2. Legacy Radio Access Networks
 - 2.1. 2G RAN overview
 - 2.2. 3G RAN overview
 - 2.3. 2G and 3G RAN services and procedures
3. Advanced Radio Access Networks
 - 3.1. LTE RAN physical layer overview
 - 3.2. LTE Radio functionalities and procedures
 - 3.3. NR RAN physical layer overview
 - 3.4. NR Radio functionalities and procedures for NSA and SA
4. Transport and Core Network
 - 4.1. The Overview of Transport Access Networks
 - 4.2. CS Core nodes description and functionalities overview
5. Traffic flows and examples
 - 5.1. The QoS framework for LTE and NR
 - 5.2. Initial attach procedure
 - 5.3. Packet and voice traffic flows
 - 5.4. Mobility scenarios and flows
 - 5.5. Dual Connectivity options in NSA
6. Towards tomorrow
 - 6.1. Open RAN
 - 6.2. Cloud and Virtualization in RAN

- 6.3. Private Networks
- 6.4. Use cases overview

Entry Requirements

ICT/Engineering background

Target Group

Junior RAN staff

Mode of Delivery

Live, instructor lead learning in a physical or virtual classroom

Duration: The duration of this course is 6 days

Language: English

Participants: The maximum number of participants for this course is 4 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Day	Topics in the course
1	Introduction
	Legacy Radio Access Networks
2	Advanced Radio Access Networks
3	
4	Advanced Radio Access Networks, Transport and Core Network
5	Traffic flows
6	Traffic flows, Towards Tomorrow

4G-5G Radio Design Principles for New/Junior RAN Employees

Course Objectives

What is the 3GPP Long Term Evolution (LTE) and New Radio (NR) strategy? How does Orthogonal Frequency Division Multiplexing (OFDMA) and Single-Carrier Frequency Division Multiple Access (SC-FDMA) used produce data rates above 1Gbps? What types of traffic are carried by the LTE and NR Network? What are the demands of the subscribers? How is the coverage and capacity of the cell calculated? How is the Radio Network implemented?

The Radio Network Design course introduces attendees to the concepts of LTE/NR and the operation of OFDMA and SC-FDMA. With this knowledge they will be guided through the Radio Network dimensioning process and given the opportunity to perform sample dimensioning exercises.

Contents

- 1 Explain the reasons behind the 3GPP Long Term Evolution (LTE) strategy.
 - 1.1 Explain the general dimensioning principles.
- 2 Describe the different types of traffic carried by LTE/NR networks.
 - 2.1 Explain the protocols that support the various LTE/NR traffic types.
 - 2.2 Explain the operation of TCP, UDP, HTTP and FTP Internet Protocols.
 - 2.3 Explain the demands of different applications.
- 3 Explain coverage in modern mobile radio systems.
 - 3.1 Outline application demands.
 - 3.2 Explain coverage versus quality.
 - 3.3 Explain link budgets in LTE/NR along with indoor considerations.
 - 3.4 Explain VoLTE dimensioning link budget.
- 4 Perform calculations on the radio interface capacity.
 - 4.1 Explain how the downlink and uplink data rates are achieved and calculated.
 - 4.2 List the LTE UE category capabilities.
 - 4.3 Explain radio wave propagation and typical channel models.
 - 4.4 Explain VoLTE capacity dependencies.
- 5 Explain the dimensioning process.
 - 5.1 Perform uplink and downlink coverage and capacity calculations.
 - 5.2 Recommend sites for deployment to meet coverage and capacity requirements set by the customer.
- 6 Explain the types of other dimensioning needed after capacity and coverage has been defined.
 - 6.1 Perform Control Channel dimensioning.
 - 6.2 Perform Tracking Area planning.
 - 6.3 Perform Paging Capacity calculations.
 - 6.4 Apply subscriber and traffic growth scenarios and perform dimensioning exercise.

- 7 Give an overview of the 5G RAN NR NSA and SA Networks
- 7.1 5G RAN NR Coverage and Capacity Dimension Process
- 7.2 Explain the 5G RAN NR Coverage and Capacity Dimension Process
- 7.3 Describe the factors that contribute to signal attenuation.

Entry Requirements

ICT/Engineering background

Target Group

Junior RAN staff

Mode of Delivery

Live, instructor lead learning in a physical or virtual classroom

Duration: The duration of this course is 3 days

Language: English

Participants: The maximum number of participants for this course is 4 persons

Time schedule

The time required always depends on the knowledge of the attending participants and the schedule stated below can be used as estimate.

Day	Topics in the course
1	Introduction
	General dimensioning principles
	Traffic types and protocols
	Coverage in modern mobile radio systems
	Radio interface capacity
2	LTE dimensioning process.
	Other dimensioning
	LTE cell planning
	Co-location and co-existence
3	5G RAN NR NSA and SA Networks
	NR Coverage and Capacity Dimension Process
	Factors that contribute to signal attenuation
	Co-location and co-existence

Small cells/Indoor solutions Planning (3G/4G/5G)

Course Objectives

Although Small Cells existed in GSM and UMTS their primary tasks were quite simple: to offload traffic in hot-spot zones and solve the coverage holes issues. They were not coordinated with surrounding macro cells. With LTE, and concept of Heterogeneous Network (HetNet), things have changed. Small Cells can now achieve tight interworking with the rest of the network. Numerous enhancements in different 3GPP Releases brought more advanced functionalities for the small cells. In 5G, small cells are expected to handle even bigger amount of traffic and make new use cases possible.

This course offers a well-rounded presentation and discussion about the technology upgrades that have made small cells implementations so feasible. It is essential for people involved in RAN Planning and Design who wish to enhance their understanding on how small cells interwork with the rest of the network and become familiar with process of their implementation: from idea to realization.

Participants will have the opportunity to realize the importance of appropriate selection of small cell location, and implementation option. Difference between indoor and outdoor small cells will also be addressed.

The session concludes by discussing the 5G trends for Small Cells.

Contents

1. Introduction

- 1.1. Drivers for Small Cells
- 1.2. Heterogeneous Network (HetNet)
- 1.3. Evolution of LTE related to Small Cells: 3GPP Releases 8-14

2. Planning

- 2.1. Deployment challenges
- 2.2. Small Cell Product Types
- 2.3. Indoor and outdoor planning
- 2.4. Selection of small cell location

3. Optimization

- 3.1. Interference management
- 3.2. Learnings from Small Cell Deployments

4. Towards tomorrow

- 4.1. Changes that 5G bring to small cells
- 4.2. New Spectrum and new use cases
- 4.3. Virtualization

Entry Requirements

Ideally Radio planning background is required from the participants.

Target Group

Technical personnel involved in Radio planning

Mode of Delivery

Live, instructor-led learning in a physical (or virtual) classroom

Duration: The duration of this course is 2 days

Language: Greek or English (teaching material in English)

Participants: The maximum number of participants for this course is 12 persons

LTE Air Interface

Course Objectives

By the end of this course participants will acquire knowledge on LTE Air Interface protocols used, the available transmission modes, available LTE Bands, the signal generation process, channel mapping, uplink and downlink physical channels and several processes used in UL and DL.

Contents

- Evolution of Cellular networks
- FDD and TDD transmission modes
- LTE spectrum Usage

Signal Generation:

- Cyclic Redundancy Check, Coding, Interleaving, Rate Matching
- Scrambling
- Modulation
- OFDM Signal Generation
- Layers and Protocols in the Air Interface

Downlink Physical Layer

- Mapping of Logical Channels to Transport channels to physical channels
- Frame structure in the time domain
- DL physical channels and signals
- Cell Search and Synchronization

Uplink Physical Layer

- Uplink physical channels and signals
- RACH Procedure
- Uplink Power Control
- Paging Procedure
- HARQ Operation
- Introduction to MIMO
- Introduction to Mobility in Idle and connected Mode

Entry Requirements

Knowledge of basic telecommunication concepts and completion of the Long Term Evolution Overview course.

Target Group

Personnel involved in radio network planning and optimization, service engineers, network design engineers.

Mode of Delivery

Instructor-led training, theory and case studies.

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 2-3 days.

Participants

The maximum number of participants is 16.

Language

English

LTE Protocols and Procedures

Course Objectives

By the end of this course participants will acquire knowledge regarding what nodes makeup the EPS architecture, what protocols are used in each of the EPS interfaces and what processes are performed by each one of the protocols. The course explains how Quality of Service is implemented and what levels of security are applied in the radio network and the transport networks. Several procedures and traffic cases are listed and discussed thoroughly.

Contents

- Introduction of the EPS Architecture
- Explain the different EPS states
- Describe the different 3GPP workgroups and releases
- List the Protocols used in E-UTRAN and RPC Interfaces
- Determine the default and Dedicated bearer concept
- Explain the Tracking Area Update concept
- Quality of Service Implementation
- Security: Authentication, ciphering and Integrity Protection at NAS and RRC protocols of the Radio Network
- Security in the Transport Network

Layer 3 Protocols and Procedures

- Non Access Stratum (Security, EPS Session Management, EPS Mobility Management)
- RRC Services and signaling messages
- X2AP
- S1AP
- GTP-C

Layer 2 Protocols

- PDCP Services
- RLC Processes
- MAC Procedures
- GTP-U

Mobility

- X2 Handover

- S1 Handover
- Intra-frequency Mobility
- Inter-frequency Mobility
- Inter-RAT Mobility

Entry Requirements

Knowledge on basic telecommunication concepts and completion of the Long Term Evolution Overview course.

Target Group

Personnel involved in radio network planning and optimization, service engineers, network design engineers.

Mode of Delivery

Instructor-led training, theory and case studies.

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 2-3 days.

Participants

The maximum number of participants is 16.

Language

English

LTE Advanced – From 3GPP Release 11 to 13

Course Objective

This course provides an overview of the specified features, services, and applications. Participants will become familiar on the RAN and Core network enhancements that will support 3GPP specifications.

Contents

By participating in this course, the participants will ideally be able to:

1. Describe 3GPP standardization principles

- 1.1. Understand the 3GPP specification numbering
- 1.2. Identify the historic evolution of releases
- 1.3. Describe the major milestones per release

2. Describe the features of releases 10 and 11

- 2.1. Introduce the early stages of LTE Advanced
- 2.2. Discuss the features of releases 10 & 11
- 2.3. Identify features implemented and their network impact

3. Describe LTE Advanced progress with Rel. 12

Understand the enhancements of LTE on:

- 3.1. Small cell and heterogeneous networks,
- 3.2. LTE multi-antennas (e.g., MIMO and beam forming),
- 3.3. LTE proximity services,
- 3.4. LTE procedures for supporting diverse traffic types
- 3.5. UMTS/HSPA+ enhancements

4. Describe LTE Advanced progress with Rel. 13

Understand the enhancements of LTE on:

- 4.1. LTE in unlicensed spectrum
- 4.2. Carrier Aggregation enhancements
- 4.3. LTE enhancements for Machine-Type Communications (MTC)
- 4.4. Elevation Beamforming / Full-Dimension MIMO
- 4.5. D2D and Positioning

5. The future 3GPP releases (14 and on)

Describe on high level the forthcoming specifications towards 5G

Entry Requirements

Telecom RAN and Core knowledge and working experience.

Target Group

Service Engineers, Network Design Engineers, Strategy Planning Engineers

Mode of Delivery

Instructor-led training, theory.

Duration: 2 days

Maximum number of participants: 16

Language: English

EPC (Evolved Packet Core) Overview

Course Objectives

This is an introductory course aiming at providing an overview of EPC infrastructure and its associated nodes, EPC protocols and interfaces, EPC mobility architecture, EPC transport domain.

Contents

- EPC Introduction
- EPC Infrastructure
- EPC Protocols and Interfaces
- QoS and Bearer in EPS, EPS Services, EPC Mobility Architecture.

Entry Requirements

Basic IP knowledge is desirable, but not necessary.

Knowledge of basic GPRS concepts is helpful but not required.

Target Group

Telecom Engineers that want to learn the 4G packet core concepts and marketing and administration personnel that want to have an insight to 4G packet core concepts.

Mode of Delivery

Instructor-led training, theory.

Duration

1 day

Participants

The maximum number of participants is 16.

Language

English

EPC Advanced Signalling

Course Objectives

This course has been designed for professionals seeking to develop a solid understanding of EPC (Evolved Packet Core) Networks and their supporting services.

The course explains the protocols and the signaling used for the 4G/5G Evolved Packet Core (5G EPC i.e. Non-Stand-Alone) infrastructure. It describes the interfaces in 4G/5G EPC (NSA) and the interworking with 3GPP 5G NR access. The specific module will explore various 4G/5G EPC (NSA) use case scenarios, with signaling traces that will be analyzed, such as Mobility, Session and Bearer management based on the 3GPP Release 15, as well as the Roaming Options (LBO & S8HR).

Contents

1. Examine the 4G/5G EPC nodes and interfaces
2. Describe the cellular mobile network technology evolution.
3. Outline the 4G/5G EPC architecture and main nodes.
4. List the 4G/5G EPC interfaces.
5. List and explain the EPS Identifiers.
6. Outline and describe the GTP based interfaces.
7. Explain the Packet Forwarding Control Protocol (PFCP).
8. Describe the SCTP based interfaces.
9. Review the protocols such as S1-AP, NAS, X2-AP, SGs-AP and Diameter.
10. Describe how different traffic cases are handled by the 4G/5G EPC nodes.
11. Outline the Attach, Authentication, and Location Management procedures.
12. Describe selected traffic cases for mobility and handover procedures.
13. Describe the Control Plane and User Plane Split (CUPS) signaling in 4G/5G EPC and explain the User Plane selection criteria.
14. List the Sx signaling messages.
15. Analyze the Dual Connectivity.
16. Describe NR access control.
17. Describe the Roaming Options (LBO & S8HR).
18. Describe VoLTE/CS voice network architecture, its components and functions of different nodes.
19. From 4G/5G EPC moving to 5G Core.

Entry Requirements

Mobile Networks knowledge background and/or working experience.

Target Group

Core Network Support Engineers and operations personnel.

Mode of Delivery

Instructor-led training including theory lectures, practical exercises and open Q&A sessions.

Duration: 2 days

Language: Lectures in Greek and/or English, course material in English

Participants: The maximum number of participants for this course is 12

Time Plan

The following time plan is indicative, exact time required per topic always depends on the needs and prior knowledge of the attendees.

Day	Topics	Estimated Time (hours)
1	Identify the 4G/5G EPC nodes and interfaces	1
	Analyze the signaling and protocols between the nodes.	2
	Analyze the traffic cases that are handled by the 4G/5G EPC nodes (Authentication, Registration, Session Management).	3
2	Roaming architecture	1
	VoLTE/CS voice network architecture, its components and functions.	2
	Evolution to 5G Core, Overview	1
	Exercises with real traces	2

EPC Planning & Design

Course Objectives

By the end of this course participants will acquire an insight and understanding of the EPC Planning & Design architecture, concepts and design. The participants will learn about how to describe EPC architecture planning and designing steps and determine IP address, QoS, APN needs for different services. They will also acquire knowledge on how to determine capacity for different interfaces, and determine the internetworking for different interfaces.

Contents

Packet Switched solution

- Access Network solution
- Connectivity options from RNC to SGSN-MME
- Understanding the concept and guideline of SGSN&MME pool
- Understanding the design guidelines for Gb , IU-PS and S1 interfaces
- Description of Evolved Packet Core
- Explanation of Evolved Packet Core solution
- Description of the nodes involved in EPC
- Physical, logical connectivity and routing of Gn, Gi, Gp, SGi, S5/S8, S4 interface
- Inband and Outband Radius server implementation
- DNS physical and logical connectivity
- Backbone and Site Infrastructure Adaptation
- Deployment dimensioning examples for MME
- Deployment dimensioning examples for SAE-GW
- Deployment dimensioning examples for other nodes in EPC (HSS,PCRF)
- MME pool planning dimensioning example

EPC Security & QoS planning

- Security policy and firewall determination
- QoS planning

Bandwidth Calculation & IP Planning for EPC

- Basic knowledge for bandwidth calculation
- Interface bandwidth calculation – control plane
- Interface bandwidth calculation – user plane
- Perform IP planning for EPC

Entry Requirements

EPC and Telecom network knowledge, ideally Packet Network planning.

Target Group

Service Engineers, Network Design Engineers

Mode of Delivery

Instructor-led training, theory and practical examples.

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 1 to 2 days.

Participants

The maximum number of participants is 12.

Language

English

EPC Transport Network Planning & Design

Course Objectives

By the end of this course participants will acquire an insight and understanding of the Transport architecture, concepts and design. The participants will learn about the scope of the EPC Transport reference network, the products involved as well as applied concepts and designs. The knowledge areas included in this course are Transport Backbone, Site Infrastructure, Packet Switch, O&M and security Network designs.

Contents

Overview of the EPC Transport

- The challenges faced in regards to the mobile operators' backbone infrastructure
- Advantages of design modularity
- EPC Transport solution explanation
- EPC Transport Reference Network design
- Network connectivity and site infrastructure requirements
- Explanation of the technology used in the EPC Transport
- IP Routing and Routing Protocols, IPv6, VPN Technology, and security concepts in IP

Site Infrastructure and Transport Backbone scope, requirements and limitations

- Network Modularization
- EPC Transport Site Switch and Router options
- Redundancy mechanisms for high availability
- VLAN traffic separation principles and security design
- EPC Transport intra-site and inter-site connectivity choices
- IGP, iBGP and Client Network routing choice
- IP/MPLS backbone design
- EPC Transport IP/MPLS transport backbone design
- Quality of Service
- General QoS purpose explanation
- 3GPP QoS model, EPC Transport QoS solution

Network View Discussion

- Network Modules within the EPC Transport design solution
- Security Solution as part of the design in EPC Transport
- The Security Domain Network Security and Design options.
- The Security Services applied for different traffic types

- O&M Network design as part of the design in EPC Transport

Entry Requirements

IP Transport and Telecom network knowledge, ideally Transport Network planning knowledge.

Target Group

Service Engineers, Network Design Engineers

Mode of Delivery

Instructor-led training with theory and practical examples.

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 1 to 2 days.

Participants

The maximum number of participants is 12.

Language

English

WCDMA Air Interface

Course Objectives

By the end of this course participants will acquire knowledge on the UTRAN Network structure and the logical, transport and physical channels used in WCDMA. Several processes such as coding and interleaving are explained regarding signal generation. Power control, mobility, rake receiver, synchronization and RACH process are some of the procedures detailed regarding WCDMA air interface.

Contents

UTRAN Network Structure

Signal Generation in the transmitter

- Cyclic Redundancy Check insertion
- Convolution coding and Viterbi decoding
- Turbo Coding
- Interleaving
- Modulation
- Filtering
- Scrambling Codes and Channelization codes
- WCDMA Power Control
- Rake Receiver
- Different Handover scenarios
- MIMO
- Multicarrier
- Logical channels, transport channels and physical channels

Physical channels: synchronization, Primary CPICH, Paging, Secondary CCPCH, PRACH, AICH, Uplink dedicated physical Data/Control channel, HS-PDSCH, HS-SCCH, HS-DPCCH

Procedures

- Synchronization procedure and Cell Search
- RACH Procedure

Entry Requirements

Knowledge of basic telecommunication concepts.

Target Group

Personnel involved in radio network planning and optimization, service engineers, network design engineers.

Mode of Delivery

Instructor-led training, theory

Duration

3 days

Participants

The maximum number of participants is 12.

Language

English

WCDMA Protocols and Procedures

Course Objectives

By the end of this course participants will acquire knowledge on the WCDMA RAN architecture and the protocols used in each of the interfaces between the network nodes. Quality of service implementation and the concept of the radio bearer are introduced. The Uu, Iu, Iub, Iur interfaces are explained. Mobility and the concepts of soft and hard handover are detailed.

Contents

WCDMA RAN Architecture

- Main functions of the nodes
- Interfaces and protocols in each of the interfaces
- Concept of Serving RNC and Drift RNC
- Mapping of Logical channels to transport channels and transport to physical channels
- Radio Bearer and RAB introduction
- Quality of Service (conversational, streaming, interactive and background)
- UE working modes : Idle mode and Connected mode (Cell DCH, Cell FACH, Cell PCH, URA PCH)
- NAS Signaling

Uu Interface

- RRC signaling messages and processes
- RLC Functions
- MAC Procedures

Iu Interface

- Iucs and Iups
- RANAP
- Iu over ATM versus Iu over IP

Iub Interface

- NBAP description
- Iub over ATm versus Iub over IP

Iur Interface

- RNSAP
- Iur over ATM versus Iur over IP

Mobility

- Soft Handover
- Hard Handover
- Intra-frequency mobility
- Inter-frequency Mobility
- IRAT Mobility (UMTS -> GSM)

Entry Requirements

Knowledge of basic telecommunication concepts and completion of the WCDMA Air Interface course.

Target Group

Personnel involved in radio network planning and optimization, service engineers, network design engineers.

Mode of Delivery

Instructor-led training, theory

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 2-3 days.

Participants

The maximum number of participants is 12.

Language

English

HSPA Services

Course Objectives

By the end of this course the participants will acquire the necessary technical knowledge on HSPA (High-Speed Packet Access) so that they can exploit the new opportunities for generating revenues.

Contents

- Introduction
- HSDPA, HSUPA and HSPA+/eHSPA
- Terminal Capabilities
- Applications
- Services

Entry Requirements

General Telecom and Business understanding.

Target Group

Non-Technical Personnel from Human Resources, Business Management, Product Marketing, Sales, Logistics, Project Management, Customer Care, and Retail shops wishing to look at HSPA from the Business Perspective.

Mode of Delivery

Instructor-led training, theory.

Duration

1 day

Participants

The maximum number of participants is 12.

Language

English

Core Network Signalling Design

Course Objectives

By the end of this course participants will acquire knowledge of the protocols used in Mobile Core Network. Classical SS7 protocols like MTP, ISUP, SCCP, TCAP, MAP are examined in detail together with the protocols SCTP, M3UA (SIGTRAN) and H.248. An examination of how a call is established with the BICC/IPBCP protocols is provided. Also, it explains the basic parts of the SIP and provides an basic overview of the IP protocol suite and the CAMEL protocol.

Contents

- Mobile Soft-Switch Solution network architecture
- List of CS Core network interfaces and protocols
- Introduction to SS7
- MTP layers functionality
- Signaling Unit Formats
- Signaling message handling and network management
- ISUP signaling capabilities
- Message structure
- ISUP call signaling flow analysis
- SCCP connectionless and connection oriented services
- Message formats and codes
- SCCP routing
- Purpose of TCAP
- Messages, format and codes
- MAP functionality and variants
- Location Update, MAP signaling analysis
- MT call, MAP signaling analysis
- Introduction to SIGTRAN
- The role of the SCTP and its main features
- SCTP messages format structures
- IETF-M3UA and specific implementations
- Explain the main terms in H.248
- List command and descriptors
- Allocate resources in MGW, ADD command analysis
- IP protocol suite

- Overview of: Ethernet, IP, TCP and UDP protocol
- BICC capabilities and important concepts
- BICC message structure
- Purpose of IPBCP
- IPBCP messages
- BICC call over IP - trace example
- SIP fundamentals
- Main messages in a SIP call
- CAMEL fundamentals

Entry Requirements

Knowledge of Mobile Core Network.

Target Group

Support Engineers

Mode of Delivery

Instructor-led training, theory and practical exercises based on traces (e.g. ISUP call, MAP LU, SCTP, H.248 ADD, BICC)

Duration

5 days

Participants

The maximum number of participants is 12.

Language

English

Signalling over IP (SIGTRAN)

Course Objectives

By the end of this course participants will acquire knowledge on the protocols involved in SIGTRAN.

Contents

- Introduction
- Stream Control Transmission Protocol (SCTP)
- MTP3 User Adaptation Layer (M3UA)

Entry Requirements

Knowledge on basic telecommunication concepts.

Target Group

Personnel involved in planning, installation, operation and maintenance and Troubleshooting of systems based on signaling over IP.

Mode of Delivery

Instructor-led training and exercises based on protocol analyzer traces.

Duration

1 day

Participants

The maximum number of participants is 12.

Language

English

Security Concepts in Telecommunications Networks

Course Outline

Security Concepts in Telecom Networks is a comprehensive two-day technical training course designed to provide participants with an understanding of security principles and practices in telecom networks.

The course covers a wide range of topics, including network security fundamentals, risk assessment methodologies, security requirements in telecom networks, security protocols, threat modeling, security design principles, and best practices for securing telecom networks.

Objective

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

- Comprehend the unique aspects of Security in Telecom networks.
- Identify Telecom-specific threats and vulnerabilities, including legacy systems.
- Implement security measures tailored for Telecom infrastructure.
- Understand regulatory frameworks affecting Telecom Security (e.g. ITU, ETSI).
- Explore security protocols specific to Telecom networks (4G, 5G and IMS).
- Recognize emerging trends and technologies that influence Telecom security.

Contents

Session 1: Introduction to Security

- What is Telecom Security or widely referred to as Cyber Security and its importance
- Key Concepts: Confidentiality, Integrity, Availability (CIA Triad)
- Layers of Security: Physical, Network, Application, and Operational
- Common Cyber threats in Telecom Security (DDoS, malware, ransomware, man in the middle, data breaches and fraud)
- Explain and highlight the differences between Authentication, Ciphering, Encryption, Public/Private Certificates
- Overview of Security Standards specific to Telecom (e.g., ETSI EN 303 645, 3GPP Security Standards), regulatory Compliance (e.g., FCC mandates, GDPR implications for Telecom)

Session 2: Telecom Network Architecture and Security Layers

- Explain Security algorithms between Access Network (Radio Nodes) and User equipment (UE)
- Authentication methods in LTE, improvements (new Identifiers) introduced in 5G
- Ciphering and integrity algorithms supported in Radio Access Network (RAN) for radio interface
- What would an attacker try to gain from the Core Network of a telecom operator
- Overview of the Core elements and their connections / protocol interactions

- Relation of the Core element networking and application protocols with the OSI layer
- Describe network security protocols used in telecommunication networks and relate them to OSI layers
- Explain the difference between a secure IP/Transport network between core elements and a secure version of an application protocol
- Security on the Roaming Network interfaces (most vulnerable, more attacks due to statistics)
- Security in OSS/BSS and other IT infrastructure

Test Exercise: Exploit 2FA SMS in SS7 to perform card fraud.

Session 3: Security Measures and Best Practices for Telecom

- Telecom-Specific Security Practices: Subscriber identity protection, signaling security
- Network Security Technologies: Telecom-grade firewalls, IDS/IPS tailored for Telecom traffic

Test Exercise: Draft a security policy addressing Telecom-specific threats and compliance needs.

Session 4: Incident Response and Management in Telecoms

- Understanding the Incident Response Lifecycle in the context of Telecoms
- The essential steps to be taken to recover from a Cyber-attack (incident Response Plan tailored for Telecom service disruptions)
- **Scenario-Based Discussion:** Work through a Telecom-specific incident response scenario, such as a network outage due to a DDoS attack in a Diameter Hub

Session 5: Emerging Trends in Security for Telecom

- Current Trends: Zero Trust Architecture in Telecom, AI in threat detection, IoT security challenges
- Future Network Security trends (AI/ML) and a holistic approach on network security
- Describe the global efforts towards an extended MITRE ATT&CK ecosystem for mobile network operators
- **Interactive Discussion:** Explore recent incidents involving Telecom infrastructure and discuss the lessons learned.

Session 6: Group Discussion and Q&A

- Open forum for discussion on Telecom security topics
- Q&A with the instructor
- Sharing of experiences and best practices among participants

Assessment and Certification

- Participants will receive a certificate of completion.
- Optional: Short quiz at the end of Day 2 to assess understanding of Telecom-specific security concepts.

This course provides Telecom professionals with targeted knowledge and practical skills necessary to enhance security within Telecom networks. By integrating real-world examples and interactive activities, participants will gain actionable insights to apply in their roles.

Entry Requirements

- Understanding of Telecommunications systems and networks
- Familiarity with Telecom protocols (e.g. SIP, SS7) and architecture.
- Basic IT knowledge (operating systems, networking)

Target Group: Telecommunications Professionals with limited or no experience in Security.

Mode of Delivery: Instructor-led learning in a virtual classroom (or onsite)

Duration: 2 Days

Maximum Number of Participants: 12

Language: English

GSM and GPRS Signalling

Course Objectives

By the end of this course participants will acquire knowledge of Common and specific procedures used in GSM and GPRS, protocols in layer 3 and 2 as well as the physical layer, important traffic cases with explicit signaling messages in all interfaces involved (MS to MSC, MS to SGSN, MS to BTS, BTS to MSC, BTS to SGSN, SGSN to GGSN). Traces will be examined using air interface test tool.

Contents

- Explanation of the nodes used in a GSM and GPRS system
- Interfaces involved and the protocols used in each of the interfaces
- Identity numbers used in GSM and GPRS
- Location Procedures
- Introduction of the multiframe and mapping of logical channels to physical channels
- Idle mode: Cell Selection & Reselection, Paging, Attach/Detach, Location Area Update (Normal & Periodic), UE & BTS Measurements
- Connected Mode:
 - Call Establishment & Release
 - Handover
 - Short Message Service
- GSM/WCDMA/LTE Handover and Cell Reselection
- System Information Description

Interfaces and Protocols in GSM

- Um Interface: Layer 3 (CC, MM, RR), Layer 2 (LAPDm) and physical Layer
 - Description of Signaling Messages exchanged
- Abis Interface: Layer 3, Layer 2 (LAPD)
 - Fix & Flex Abis, Packet Abis and Abis over IP
- A Interface
 - Introduction to SS7 , explain BSSAP, MTP, SCCP modes of operations and messages
 - Core network Protocols: MAP, TCAP, ISUP.

GPRS Introduction

- Evolution of GPRS for GSM, WCDMA and LTE
- Overview: Meaning of TBF, PDP Context (primary & secondary), APN, IP addresses
- GPRS States
- QoS in R97 and R99

- Triple access Interfaces
- General Traffic cases and Signaling

GPRS Interfaces and Protocols

- Distinguish between Non Access Stratum (NAS) and Access Stratum (AS) interfaces
- Protocol Stack
- MS <-> SGSN Signaling: Security establishment, Mobility Management, Session Management
- GPRS SS7 Interfaces
- GPRS IP Interfaces and IP connectivity
- GPRS Tunneling Protocol (GTP-C, GTP-U)
- IP-Sec
- Gs, Gn/Gp, Gb Interfaces
- Um Interface: SNDCP, LLC, RLC/MAC, Physical layers
- SGSN <-> BSC Signaling: BSSGP, BVC, NS-VL, NS-VC
- UDP, IP, Ethernet
- RBS <-> MS Signaling: Logical Channels mapping to Physical channels
- Reservation of PDCH
- Packet Idle & Packet Transfer Modes
- Link Quality Control, Incremental Redundancy, Link Adaptation

GPRS Traffic Cases

- Combined GPRS/ IMSI Attach/Detach
- Paging Coordination for GPRS
- PDP Context Activation/Deactivation
- Intra & Inter SGSN RA Update
- Cell Selection & Reselection, Cell Update
- Dual Transfer Mode (DTM)
- Network Assisted Cell Change & RIM
- Scheduling of uplink TBF
- Scheduling of Downlink Data Blocks
- CS Fallback

EDGE Evolution

- Reduced Latency, Dual Carrier, 16QAM/32QAM.

Entry Requirements

Knowledge of basic telecommunication concepts.

Target Group

Personnel involved in planning, design, operation and maintenance and troubleshooting.

Mode of Delivery

Instructor-led training, theory and exercises based on traces.

Duration

5 days

Participants

The maximum number of participants is 12.

Language

English

IPTV Networks and Services

Course Objectives

By the end of this course the participants will acquire the necessary technical knowledge on IPTV (Internet Protocol Television) so that they can exploit the new opportunities for generating revenue from the new service offerings.

Contents

- Introduction
- Customer network
- Public network
- Service provider network
- IPTV future

Entry Requirements

General Telecom and Business understanding.

Target Group

Non-Technical Personnel from Human Resources, Business Management, Product Marketing, Sales, Logistics, Project Management, Customer Care, and Retail shops wishing to look at IPTV from the Business Perspective.

Mode of Delivery

Instructor-led training, theory.

Duration

1 day

Participants

The maximum number of participants is 12.

Language

English

Core Transport Network Technologies

Course Objectives

By the end of this course the participants will acquire technical knowledge on Core Transport Network systems and technologies.

Contents

- Introduction
- Network architecture
- Protocols
- IP and IPv6
- MPLS
- Quality of service

Entry Requirements

General Telecom understanding

Target Group

Managers and Engineers wishing to be familiar with the Next Generation Core Network.

Mode of Delivery

Instructor-led training, theory.

Duration

2 days

Participants

The maximum number of participants is 12.

Language

English

Introduction to the TCP/IP Protocol

Course Objectives

The objective of this class is to introduce the TCP/IP protocol and network architecture and examine its advantages with respect to other network technologies

Contents

- The Internet
- TCP/IP Architecture
- Network Access Layer
- Internet Layer
- Transport Layer
- Routing
- Domain Name Systems (DNS)
- TCP/IP and the End User
- IP v6

Entry Requirements

Basic telecommunications and networking knowledge.

Target Group

System and network analysts, programmers, administrators, and end-users.

Mode of Delivery

Instructor-led training, theory and and case studies.

Duration

2 days (3 days with IP v6 option)

Participants

The maximum number of participants is 16.

Language

English

MPLS Overview

Course Objectives

By the end of this course the participants will acquire technical knowledge on MPLS systems and technologies.

Contents

- Introduction
- Network architecture
- Protocols (LDP, Diffserv, QoS)
- Traffic Engineering
- Applications
- Security Issues

Entry Requirements

General Telecom understanding.

Target Group

Managers and Engineers wishing to be familiar with the MPLS Network.

Mode of Delivery

Instructor-led training, theory.

Duration

The duration can be adjusted in order to cover the individual target groups' needs and perspectives and can range from 1-2 days.

Participants

The maximum number of participants is 16.

Language

English

SDH Theory and Networks

Course Objectives

This course will offer to the participants a thorough understanding of:

- SDH characteristics and advantages over PDH systems
- Structure of STM frames
- Multiplexing and Mapping in SDH
- Synchronization aspects and protection capabilities of SDH systems
- SDH Network Applications

Contents

- From PDH to SDH
- STM Frames
- SDH multiplexing and mapping
- Overhead Information and the role of Pointers
- Synchronization and Protection Schemes
- Alarms and Management of SDH Networks
- SDH Network Applications
- Ethernet over SDH

Entry Requirements

Basic knowledge on digital communications.

Target Group

Personnel involved in the planning, installation, operation and maintenance of SDH networks and systems.

Mode of Delivery

Instructor-led training, theory.

Duration

2-3 days

Participants

The maximum number of participants is 16.

Language

English

IP/MPLS, MPLS-TP & Carrier Ethernet

Course Objectives

The trainees will have a description of the IP/MPLS, MPLS/TP & Carrier Ethernet and a detailed view of most of their implementations.

Course Contents

- Introduction to different Metro Transport Methods
- Layer 2 Basics (Broadcast and Collision Domains, VLANs, 802.1Q, Trunking, Q in Q, Spanning Tree Algorithm)
- ELS, E-LAN, UNI, EVCs, Traffic Attributes, VLAN Tagging
- OSPF & OSPF TE
- Introduction to MPLS
- L3 VPNs (GRE VPNs, MPLS VPNs)
- L2 Ethernet Services over MPLS
- PseudoWire Concept, Ethernet over MPLS (Draft Martini)
- T-MPLS
- PBB & PBB-TE
- VPLS
- MPLS LDP, MPLS TE, MPLS/TP (Transport Profile)

Entry Requirements

Basic knowledge of Networking, Ethernet and TCP/IP protocol, basic knowledge of terms such as packet and frame

Target group

Individuals that are administrators of MAN topologies or for network engineers that intend to know the basics of IP/MPLS, MPLS/TP and Carrier Ethernet technologies

Mode of Delivery

Instructor-led training, theory.

Duration

3 days

Participants

The maximum number of participants is 16.

Language

English

Train the Trainer for Technical Instructors

Course Objectives

The purpose of this workshop is to demonstrate to the participants how their skills can be streamlined in order to deliver not only effective but also high impact trainings. In view of substantial training needs in large organizations, this course aims to develop the skills of the participants so that they can deliver internal training in a structured way.

Contents

Background

- Communication skills
- Learning Styles, Models and Training Methodologies
- Instructional Design Methodology (Analysis, Design, Implementation, Evaluation)
- Comparison of different Training Aids and Physical Arrangements
- Audience Handling Techniques

Practicals

- Case Studies
- Repetitive Assignments (Educational Scenarios) captured on video
- Feedback provided by the group and the facilitator
- Evaluation of attendees performance on previous assignments

Entry Requirements

Passion for training! Communication skills, knowledge transfer ability as well as inspiring and motivating personality.

Target Group

This course is designed for professionals who desire to improve their skills as professional technical training instructors.

Mode of Delivery

Short lectures, case studies, recording presentations on video, evaluating presentation skills and assessing teaching effectiveness.

Duration

The duration of this workshop can be tailored to meet the target group needs and experience.

Participants

Due to the nature of this workshop, the maximum number of participants is 8.

Language

English