LEARNING SERVICES

Internet of Things (IoT)
Training Programs

Catalog of Course Descriptions

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Catalog of Course Descriptions

Introduction

Ericsson has developed a comprehensive Training Programs service to satisfy the competence needs of our customers, from exploring new business opportunities to expertise required for operating a network. The Training Programs service is delineated into packages that have been developed to offer clearly defined, yet flexible training to target system and technology areas. Each package is divided into flows, to target specific functional areas within your organization for optimal benefits.

The delivery of the Learning Products is realized by various Services:

Icon	Service
	Instructor Led Training (ILT)
	eLearning (WBL)

5G Overview

LZU1082613 R2A

Description

Do you want to know Ericsson's 2020 Vision for 5G and the Networked Society? In this course we give you an overview of the road to 5G, including LTE Evolution and the new Radio Access Technology planned for 5G. We also have a look at the use cases that drive the 5G development and the technology areas that will enable 5G.

Learning objectives

On completion of this course the participants will be able to:

1 Give an overview of the 2020 vision for the Networked Society and 5G
1.1 Describe the Networked Society
1.2 Describe the NGMN use case categories
1.3 Define the scope of 5G

2 Describe proposals, solutions and architecture of 5G Radio Access Network
2.1 Describe the Technology Areas that enable 5G
2.2 Describe the LTE Evolution and 5G Plug-ins
2.3 Give an overview of the NR radio access technology
2.4 Describe the flexible numerology
2.5 Describe the flexible infrastructure
2.6 Describe the concept of Cloud Infrastructure and the impact on hardware and RAN Management

3 Describe the proposals, solutions and architecture for 5G Core network
3.1 Give an overview of the core network solutions for 5G
3.2 Describe the different options for NR Non-Stand-Alone (NSA)
3.3 Explain on an overview level the NFV/SDN and management infrastructure

4 Describe Ericsson's engagement and involvement in standardization and 5G programs
4.1 List some of the industry and academic partners
4.2 Give an overview of 5G work within METIS, 5G PPP, ITU and 3GPP

Target audience

The target audience for this course is:

Service Engineer, Service Design Engineer, Network Design Engineer

Prerequisites

Successful completion of the following courses:

- General telecom basics is required
- "LTE/SAE Overview" equivalent knowledge is desirable, but not mandatory

Duration and class size

The length of the course is 1 day and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	Networked Society and 5G overview	1.5
	5G RAN solutions	2
	5G Core solutions and options	2
	Standardization and cooperation	0.5

IoT Accelerator (IOTA) – Basic Concepts and Demonstration

LZU 108 2753 R1A

Description

IOT Accelerator (IOTA) is the Ericsson IOT platform, which offers IOT Service Packages. Service Packages are building blocks of the IOT Solutions, and each of them can be used for building IOT Use Cases from different Industries.

IOT Accelerator (IOTA) significantly consolidates and facilitates implementation of IOT applications for Application Developers, and whole IOT solutions - in partnership with Device Manufacturers and Application Developers - for Service Providers.
From the Perspective of Service Providers IOTA addresses agile IOT use cases deployment for different industries, security, billing Customers, flexible revenue sharing with Partners and scalability from very small up to very large IOT solutions.

IOT Service Provider can pick IOTA Service Packages individually or in different composition to build own IOT offerings on the Market.
IOTA – with its as a Service approach - enables high scalability. Service Providers can start with small Services Packages block sizes up to the highest ones when their IOT business grow.

This course presents IOTA with its Service Packages building blocks and the IOTA platform interactions with IOT Devices using IOTA Device and Data Management (DDM) Service Package.
It demonstrates how IOTA works and what is its potential for building IOT solutions.
Would you like to get know how to find description of different IOT Solutions, Ericsson IOT Ecosystem Partners who designed them, IOTA Services Packages available in the IOT Accelerator?
In this course you will experience all of these demonstrated live in the IOT Accelerator.

Since the course lets participants understand what IOT Accelerator offers, it is recommended as a prerequisite course before the workshop dedicated to building IOT strategy and planning first stages of offerings IOT on the market.

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Learning objectives

On completion of this course the participants will get to know the following subjects:

1 IOTA Accelerator Overview

1.1 IOT - Basic concepts
1.2 IOTA - Basic concepts
1.3 IOTA DDM Service Package
1.4 IOT Ecosystem
1.5 Massive Device Onboarding

2 Demo Case: Interactions IOTA Platform <> Smartphone as IOT Device

2.1 Observation of a Device Sensor in Realtime
2.2 Sending information to a Device Actuators
2.3 Rules and Events – creation and triggering

3 Demo: IOTA API call, IOT Marketplace

3.1 Call IOTA API
3.2 Search IOTA Marketplace Portal for: Industries' Use Cases, IOTA Services' descriptions, Partners with their IOT Solutions; Register interest

4 IOT Accelerator – Summary, Discussion

Target audience

The target audience for this course is:
Sales and Customer Engagement Specialists and Managers.

Prerequisites

-IOT Overview WBL/ILT course completed,

-Trainer's Laptop and smartphone has access to IOTA platform through the Customer's WIFI Network or Cellular network.

Duration and class size

The length of the course is 1 day and the maximum number of participants is 12.

Learning situation

This course is based on practical instructor-led workshop given in a classroom environment in the Ericsson or Customer location.

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	IOTA Accelerator Overview	2
	Demo Case: Interactions IOTA Platform <> Smartphone as IOT Device	2
	Demo: IOTA API call, IOT Marketplace	1
	IOT Accelerator – Conclusion, Discussion	1

IOT Accelerator Device & Data Management Configuration & Operation DEMO

LZU 108 2754 R1A

Description

IOT Accelerator significantly facilitates implementation of IOT Solutions.
Would you like to refresh your knowledge and skills concerning: Services catalogue, Device and Data Management, API documentation, Marketplace Portal?

In this course you have presented the whole scope of the IOT Accelerator Device & Data Management Configuration and Operation course in the form of the video material – you will watch particular configurations, operations, and their results made and commented by the Ericsson expert in the IOTA Accelerator and on his Smartphone used as the IOT Device.

Learning objectives

On completion of this course the participants will remind how to:

1 Operate the IOTA Native Device and Data Management (DDM) service
1.1 Login IOTA, enter DDM Service, create objects in DDM
1.2 Mass onboard Devices
1.3 Observe a Device Sensor in Realtime
1.4 Send information to a Device Actuators
1.5 Create Rules based on values from Sensors
1.6 Remove IOTA DDM data

2 Use and understand IOTA Services, API documentation, Marketplace Portal
2.1 Walk through IOTA Services
2.2 Call IOTA APIs
2.3 Search IOTA Marketplace Portal for: Industries' Use Cases, IOTA Services' descriptions, Partners with their IOT Solutions; Register Interest

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Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, Field Technician, System Administrator, Application Developer, Business Developer, Customer Care Administrator.

Prerequisites

Successful completion of the following courses:

Internet of Things (IoT) Overview - LZU1082344 or Ericsson Internet of Things (IoT) Overview (WBL) - LZU1082656

Duration and class size

The length of the course is 40 min.

Learning situation

This course is based on the Web Based Learning material.

Time schedule

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

Day	Topics in the course	Estimated Time (min)
	IOTA Native Device and Data Management Exercises	20
	IOTA Services catalogue, API documentation, Marketplace Portal	20

IOT Accelerator Device & Data Management Configuration & Operation

LZU 108 2751 R1A

Description

IOT Accelerator significantly facilitates implementation of IOT Solutions.
Do you know how to create and operate IOT Device Network in the Ericsson IOT Platform – IOT Accelerator (IOTA)?
Do you know how to find description of different IOT Solutions, Ericsson IOT Ecosystem Partners who designed them, descriptions of IOTA Services available for you?
Do you know how to call APIs developed in the Ericsson's IOT global Ecosystem?

In this course you will practice all of these by executing particular commands on live IOT Accelerator instance and watching results in the IOTA and your Smartphone as IOT Device. The course addresses the following IOTA issues: Services catalogue, Device and Data Management, API documentation, Marketplace Portal.

Learning objectives

On completion of this course the participants will be able to:

1 Operate the IOTA Native Device and Data Management (DDM) service
1.1 Login IOTA, enter DDM Service, create objects in DDM
1.2 Mass onboard Devices
1.3 Observe a Device Sensor in Realtime
1.4 Send information to a Device Actuators
1.5 Create Rules based on values from Sensors
1.6 Remove IOTA DDM data

2 Use and understand IOTA Services catalogue, API documentation, Marketplace Portal
2.1 Walk through IOTA Services catalogue
2.2 Call IOTA APIs
2.3 Search IOTA Marketplace Portal for: Industries' Use Cases, IOTA Services' descriptions, Partners with their IOT Solutions; Register Interest

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Target audience

The target audience for this course is:
Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, Field Technician, System Administrator, Application Developer, Business Developer, Customer Care Administrator.

Prerequisites

Successful completion of the following courses:

Internet of Things (IoT) Overview - LZU1082344 or Ericsson Internet of Things (IoT) Overview (WBL) - LZU1082656

Duration and class size

The length of the course is 2 days and the maximum number of participants is 8.

Learning situation

This course is based on practical instructor-led workshop given in a classroom environment in the Ericsson or Customer location.

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	Presentation of IOTA Native Device and Data Management	1,5
	IOTA Device and Data Management Exercises	4,5
2	IOTA Device and Data Management Exercises	1,5
	IOTA Services catalogue, API documentation, Marketplace Portal	3,0
	Removal of IOTA DDM data	1,0
	Conclusion	0,5

Ericsson CEE Overview R6.6

LZU1082719 R1A

Description

The Ericsson Cloud Execution Environment (CEE) provides virtual infrastructure management for cloud services. This allows various applications to make use of the virtual resources for compute, storage and networking. The CEE provides virtual machine lifecycle management in a high available and low latency performance environment.

Upon the completion of this course, the participant will be able to understand the basic function of the CEE, its architecture and VM lifecycle management in CEE R6.6.

Learning objectives

On completion of this course the participants will be able to:

1 Describe the highlights of the Cloud Execution Environment (CEE)
1.1 Discuss the positioning of the CEE software in the overall Ericsson Cloud System solution
1.2 Identify the logical architecture of the CEE
1.3 List the hardware integrations for the CEE
1.4 Discuss the enhancements introduced with the CEE R6.6 release

2 Describe the functions of the CEE for virtual machine lifecycle management
2.1 Explore the virtual machine lifecycle management through the Openstack services in CEE
2.2 Describe the services running in the infrastructure hosts, such as operating system, hypervisor and storage architecture

3 Describe the virtual infrastructure management function of the CEE
3.1 Describe the function of the vCIC in CEE
3.2 List high availability (HA) features in CEE for services and databases
3.3 Describe the function of Atlas as a virtual infrastructure management dashboard

Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Technician, Service

Technician, Service Engineer, System Engineer, Field Technician, System Administrator, Application Developer, Business Developer, Customer Care Administrator

Prerequisites

Successful completion of the following courses:

None

Duration and class size

The length of the course is 1 hour and the maximum number of participants is unlimited.

Learning situation

This course is a web-based learning.

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
1	CEE Introduction	20 min.
	CEE Functional Description	20 min.
	CEE Infrastructure Management	20 min.

GSM System Survey

LZU108852 R16A

Description

Are you lost when discussing GSM network basic concepts? If you are starting to work in different areas of GSM system and need a general overview, this is the course you are looking for. It will provide you with knowledge about Ericsson's GSM based systems and GSM 800/900/1800/1900.

It will focus on GSM terminology, wireless concepts, functions of network nodes, and the Ericsson implementation of those network nodes. Completing this training you will have all the initial knowledge you need to proceed in competence development in other areas.

Learning objectives

On completion of this course the participants will be able to:

1 Know how mobile systems have evolved over the time and tell the history of GSM development.
1.1 Recognize benefits of having a standard
1.2 Describe the GSM geographical network structure and node functions
1.3 Know the GSM frequency bands
1.4 List subscriber services provided in the GSM network

2 List Ericsson's GSM System divisions and components and perceive how Ericsson has been involved in GSM since its inception and took an active part in the GSM specification process.
2.1 List network components and describe their functions
2.2 Describe optional additional network entities functions
2.3 Briefly present Protocols used in the GSM Access and Core Networks

3 Know basic concepts of wireless communications and its importance to provide a good knowledge of how GSM Systems works.
3.1 Explain Time Division Multiple Access technique (TDMA)
3.2 List the transmission problems and their solutions
3.3 Recognize how Adaptive Multi-Rate (AMR) can increase capacity
3.4 Explain the feature VAMOS.

4 List and identify GSM System mandatory concepts of air interface, their functions and required specifications.
4.1 Know the concepts of physical channel and a logical channel
4.2 List one important piece of information sent on each of 3 different logical channels

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4.3 Briefly explain the idea of mapping
4.4 Show the time slot power saving feature

5 Differentiate the platforms that provide the network nodes and functionalities that are basis to provide Circuit and Packet switching, including AXE and CPP platform principles, list the main components and outline the main features.
5.1 Know the function of APT and APZ
5.2 Differentiate functions that can be implemented using AXE platform modularity
5.3 Explain how the group switch switches calls
5.4 Discriminate the AXE 810 hardware structure
5.5 Discriminate the CPP Hardware Platform
5.6 Show CPP Interconnection Structure
5.7 Clarify functions that can be implemented using CPP platform

6 Explain how Ericsson implements the functions and nodes of the GSM switching system.
6.1 Name the nodes in the Switching System
6.2 Know Ericsson's Mobile Softswitch Solution
6.3 List which nodes that are contracted for the security procedure in the GSM system
6.4 Briefly explain the purpose of Authentication, Ciphering and Equipment Check

7 List and identify Radio Access Network system nodes, its functions and required specifications.
7.1 Outline the main functions of a BSC, TRC and RBS
7.2 Explain the new BSC Evo Controller
7.3 Describe the Abis over IP and Abis Optimization solution
7.4 Briefly Explain A-Interface over IP
7.5 Explain the feature Iur-g
7.6 List the Ericsson's RBS 2000 and 6000 configurations
7.7 Explain Multistandard RBS Mixed Mode (GSM)
7.8 Explain the RBS architecture and functional blocks
7.9 List the RBS 6000 Configurations

8 Clarify the GSM traffic cases to consolidate all the GSM Network concepts using basic traffic cases examples.
8.1 Explain the purpose of GSM ID-number (MSISDN, IMSI, TMSI, MSRN and LAI)
8.2 Know the handover, locating and location updating concepts
8.3 Briefly describe how a traffic case works

9 Explain the basic concepts and difficulties of planning a cellular network, based on examples and explanations.
9.1 List the stages in the cell planning process
9.2 Explain the terms Grade of Service (GOS) and 'Erlang'
9.3 Name 2 types of Interference
9.4 Describe briefly the feature 'Re-Use of Frequencies within a Cell'
9.5 Know what is meant by the term 'Hierarchical Cell Structure'
9.6 Describe briefly the feature 'BCCH in Overlaid Sub cell'

10 Recognize Ericsson's Operation and Support System – OSS as an important tool for operation and maintenance in GSM network describing its features and functions.
10.1 Explain the functions of the Operations and Support System
10.2 Describe the architecture of the Operations and Support System
10.3 Outline the implementation of the Multi Mediation
10.4 Appreciate the implementation of the Ericsson Multi Activation

11 List the most common and main subscriber services, explaining their functions, features, and specifications.
11.1 Define the different types of services available in the network
11.2 Indicate one of each of the following service types in the network: teleservices, bearer services and supplementary services
11.3 Identify one of the Ericsson innovative services in the network.
11.4 Briefly describe the mobile intelligent network services available with Ericsson GSM systems
11.5 Know the need and advantages of the CAMEL system

12 Identify charging and accounting concepts.
12.1 Identify their functions, features and required specifications
12.2 Explain the fact that the charging concept is changing due to the introduction of new technologies such as GPRS, UMTS
12.3 List three call components
12.4 Explain the future of billing

13 Discriminate how data calls are initiated in the GSM network and cite examples of how a data call is handled in a GSM network through a traffic case analysis.
13.1 Explain the data transmission services which GSM offers
13.2 Describe a GSM data traffic case
13.3 List the data transmission services which GPRS offers
13.4 List the things that can lead to improved GPRS end-user performance
13.5 Describe a GPRS data traffic case
13.6 Analyze PS DL Power Control
13.7 Explain the EDGE and EDGE Evolution.

14 Have an overview of the possible future functionality of GSM-based systems
14.1 Describe the evolution of GSM to WCDMA systems
14.2 List the technologies that will bridge these two systems including HSCSD, EDGE, GPRS, WCDMA and HSPA and LTE
14.3 Explain the 3G system and feature Adaptive Traffic Control
14.4 Clarify the Fast Return to LTE after Call Release and LTE to GSM NACC
14.5 Explain IoT in GSM.

Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, Field Technician, System Administrator, Application Developer, Business Developer, Customer Care Administrator

Prerequisites

The participants should be familiar with telecommunication basics.

Duration and class size

The length of the course is 4 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	Course Introduction & pre-course test	0.5
	Introduction to Mobile Telecommunications and GSM	1.0
	Overview of Ericsson's GSM Systems	1.5
	Wireless Concepts	2.0
	Channel Concepts	1.0
2	Channel Concepts Continuation	1.5
	Introduction to AXE and CPP	1.5
	Switching System	1.5

	Radio Access Network	1.5
3	Traffic Cases	2.5
	Cell Planning	1.5
	Operation and Maintenance tools	1.0
	Mobile IN and Subscriber Services	1.0
4	Charging and accounting	1.0
	Data Services	2.0
	The future of GSM	2.0
	Post-course Test	1.0

HSS-FE 1 Operation and Configuration for EPC and IoT

LZU1082584 R1A

Description

This course provides participants with the knowledge and skills necessary to perform Surveillance, Operation and Configuration activities on the virtual HSS-FE 1 node in the Evolved Packet Core environment. The course covers both virtual and native HSS-FE.

Learning objectives

On completion of this course the participants will be able to:

1 Describe HSS-FE node functions and interworking
1.1 Describe the network solutions that Ericsson HSS-FE is a part of
1.2 Describe HSS-FE functions in a Packet Core environment
1.3 Describe HSS-FE functions in Narrowband IoT
1.4 Explain HSS-FE interworking, interfaces and protocols

2 Explain the HSS-FE node architecture
2.1 Explain HSS-FE implementation as a VNF
2.2 Explain External Connectivity and eVIP functionality
2.3 Perform Scaling Management

3 Explain HSS-FE Operation and Maintenance Principles
3.1 Describe O&M Interface
3.2 Perform Compute Resources Check
3.3 Explain Fault Management principles
3.4 Perform HSS-FE Health Check
3.5 Explain Performance Management principles
3.6 Perform Backup and Restore

4 Configure EPC HSS-FE components and interfaces
4.1 Configure ESM parameters (ESM Configuration Container)
4.2 Configure Narrowband IoT parameters
4.3 Configure the interface between HSS-FE and CUDB
4.4 Configure the S6a interface between HSS-FE and MME
4.5 Configure MAP interface between HSS-FE and HLR
4.6 Configure SWx interface between HSS-FE and AAA

5 Configure AVG Module in HSS-FE
5.1 Configure AVG in HSS-FE

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Target audience

The target audience for this course is:

System Engineer, Service Engineer

Prerequisites

Successful completion of the following courses:

Virtual EPC Overview LZU1082264
EPC Signaling LZU1087580
The following course is a prerequisite for native HSS-FE 1:
BSP 8100 Operation and Maintenance LZU1089779
The following course is a prerequisite for virtual HSS-FE 1:
Virtual IMS Concepts LZU1082227
The following courses become prerequisites if HSS-FE 1 is a part of Ericsson Certified Cloud offering:
BSP 8100 Operation and Maintenance LZU1089779
Cloud Execution Environment 16A (CEE), LZU1082354
Ericsson Cloud Execution Environment 16A (CEE) System Administrator, LZU1082353

Duration and class size

The length of the course is 2 days and the maximum number of participants is 8.

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in a technical environment using equipment and tools, which are accessed remotely.

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	HSS-FE node functions and interworking	2
	HSS-FE Node Architecture	2
	HSS-FE O&M Principles	2
2	EPC HSS-FE Configuration	6

Internet of Things (IoT) Overview

LZU1082344 R3A

Description

Internet of Things (IoT) is the next evolutionary step in enabling the Networked Society. Beyond connecting people with voice and data communications, IoT enables the inter-connection of devices in various fields of application, from consumer devices, to utilities-based meters to sensors in industries. The objective of this course is to describe, on an overview level, the Internet of Things (IoT) concept. Ericsson offerings and solutions as we move into the Networked Society will also be discussed, together with products and features, requirements, use cases, and network description.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the concept of Internet of Things (IoT)
1.1 Underline the IoT market landscape
1.2 Identify the difference between critical and massive Machine-Type Communication (MTC)
1.3 Explain the challenges involved with IoT
1.4 Describe current IoT connectivity options available for IoT
1.5 Explain the Standardization in IoT
1.6 Highlight the IoT related network evolution

2 Describe Ericsson IoT portfolio
2.1 Analyze the IoT functional stack
2.2 Underline IoT devices and gateways characteristics
2.3 Explain the network architecture
2.4 List current connectivity solutions
2.5 Discuss IoT requirements and solutions in the Evolved Packet Core (EPC)
2.6 Explain the User Data Management (UDM) solution
2.7 Describe analytics and exposure concepts
2.8 Explain the Ericsson IoT Accelerator layers
2.9 Discuss 5G in the IoT context

3 List the Internet of Things use cases
3.1 Highlight how different solutions fit in IoT landscape
3.2 Discuss potential use cases
3.3 List existing use cases
3.4 Show 5G use cases

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Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, Field Technician, System Administrator, Application Developer, Business Developer, Customer Care Administrator

Prerequisites

Successful completion of the following courses:

General telecom/IT background (equivalent to overview trainings)

Duration and class size

The length of the course is 1 day and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	Explain the concept of Internet of Things (IoT)	1 hours
	Describe Ericsson IoT Portfolio	4 hours
	List the Internet of Things use cases	1 hour

IoT RAN Cat-M System Techniques

LZU1082700 R1A

Description

Do you know how LTE-M, commonly known as Cat-M Access, is realized? The Internet of Things (IoT) is foreseen to be an important driver for digitalization and the next technology revolution. To address the massive IoT market, the Low Power Wide Area Network uses some new functionalities standardized in 3GPP. One of the main solutions is LTE-M or Cat-M Access. This course explains the details of the high-end MIoT solution Cat-M1. It presents how Cat-M Access is implemented, its characteristics, features, air interface, protocols and capacity considerations.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the concept of Massive IoT
1.1 Discuss the IoT market situation
1.2 Compare the different types of Machine-Type Communication (MTC)
1.3 Describe the Massive IoT technologies
1.4 Compare NB-IoT vs Cat-M solutions
1.5 List the requirements and characteristics for MIoT devices
1.6 Underline the Massive IoT network architecture and the protocols

2 Detail the Cat-M Access solution
2.1 Explain the Cat-M Access Air Interface
2.2 Describe the Cat-M Access Features and related parameters
2.3 Detail the Cat-M access configuration
2.4 Explain the Core Network Related Configuration
2.5 Explain the Operation and Maintenance (O&M)
2.6 Explain how to handle licenses in Cat-M Access
2.7 Describe Cat-M Access Observability

3 Underline the typical use cases and capacity considerations
3.1 Identify the typical use cases for Cat-M Access
3.2 Discuss the use cases' requirements
3.3 Describe the dimensioning capacity considerations

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Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Engineer, Service Engineer

Prerequisites

Successful completion of the following courses:

Internet of Things (IoT) Overview - LZU1082344
LTE L18 Radio Network Functionality - LZU1082701

Duration and class size

The length of the course is 1 day and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	1
	Functionality	2
	Operation and Maintenance	1,5
	Use cases and capacity	1
	Conclusion	0,5

LTE L18 Air Interface

LZU1082699 R1A

Description

Do you need to know what information elements are within each of the LTE layer 1 channels and where to find them in the physical layer resource?

This course reveals the radio technology involved in E-UTRAN (Evolved UTRAN, also referred to as LTE – Long Term Evolution).

The course provides detailed descriptions and explanations of the radio interface channel structure and explains the concepts of channel coding, modulation, OFDM (Orthogonal Frequency Division Multiplexing), SC-FDMA (Single-Carrier Frequency Division Multiple Access), MIMO (Multiple Input Multiple Output), Resource Blocks, Scheduling, control signaling, System Information, FDD, TDD. Paging, cell search and random access are also explained on an overview level.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the LTE radio interface general principles
1.1 the evolution of cellular networks
1.2 Summarize the evolution of 3GPP releases, from release 99 to release 14
1.3 Expected specifications on 3GPP Release 15 and 16 along with timelines
1.4 Describe the radio interface techniques
1.5 Explain the time domain structure
1.6 Describe the flexible spectrum usage
1.7 Explain the concepts of channel coding and FEC (Forward Error Correction)
1.8 Describe the principle for OFDM
1.9 Describe UL and DL scheduling principles and signaling

2 Detail the downlink transmission technique and describe the radio interface structure
2.1 Detail the channel structure of the radio interface
2.2 Describe the physical signals in UL and DL
2.3 Detail the radio interface protocols
2.4 Explain the cell search procedure
2.5 Detail the downlink transmission technique
2.6 Have a good understanding of the OFDM principle, signal generation and processing

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2.7 Detail the reference symbols in DL
2.8 Detail the DL control signalling and formats
2.9 Detail the paging procedures

3 Detail the uplink transmission technique
3.1 Have a good understanding of the SC-FDMA principle, signal generation and
3.2 Explain the pros and cons with OFDM and SC-FDMA
3.3 Detail the UL control signaling and the PUCCH formats
3.4 Detail the random access preamble formats and the RACH root sequence allocation
3.5 Describe Power Control and UL transmit timing control

4 Detail MIMO in LTE
4.1 Describe the general concepts of beamforming, diversity and spatial multiplexing
4.2 Describe the radio channel and antenna basics
4.3 Describe the concepts of channel rank, transmission rank, precoding and layers
4.4 List and explain the transmission modes in 3GPP Release 8-13
4.5 Explain SU-MIMO and MU-MIMO
4.6 Describe open loop and closed loop spatial multiplexing in LTE

Target audience

The target audience for this course is:

Service Engineer, Service Design Engineer, Network Design Engineer

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview LZU1087020

Duration and class size

The length of the course is 3 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	4
	Downlink Transmission Technique	2
2	Downlink Transmission Techniques continued	5
	Uplink Transmission Technique	1
3	Uplink Transmission Technique continued	3
	MIMO in LTE	3

LTE L18 Protocols and Procedures

LZU1082693 R1A

Description

Do you need to know what procedures are triggered in the EPS network and how? What messages are exchanged among the LTE and EPC nodes? And which protocols are used to implement them? This course provides an in depth understanding of the various protocols and procedures in the E-UTRAN. It looks into the overall EPS architecture, the functionalities of each node and the interfaces interconnecting them. It details how Quality of Service and the different levels of security are implemented in LTE. Focus is given on the functions and services provided by various L3 signaling protocols, NAS, RRC , GTP-C, and the different L2 transport protocols, PDCP, RLC and MAC. It provides a thorough discussion of the Attach procedure and the different types of intraLTE, interLTE, and IRAT mobility.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the EPS Protocol Architecture
1.1 Distinguish between the different EPS Protocols
1.2 Explain the EPS architecture, Bearer and Tracking Area
1.3 Draw a simplified EPS diagram showing the protocols used

2 Explain the LTE/SAE Quality of Service and Security in LTE
2.1 Explain the purposes of EPS Bearer Service and Data Radio Bearer
2.2 List the different attributes of the Data Radio Bearer and explain how they are used
2.3 Explain Authentication Procedure
2.4 Explain Radio Access Security
2.5 Explain TN Security

3 Explain the various L3 Signaling Protocols
3.1 Explain the functions of the Non Access Stratum NAS protocol
3.2 Describe the different procedures in the NAS layer
3.3 Explain the interaction between RRC and the lower layers in the control plane
3.4 Explain the RRC connected and idle modes (states)
3.5 Explain the functions and services of RRC such as System Information Broadcast, Paging, Cell Selection and Mobility
3.6 Explain the main functions and procedures of X2AP signaling protocol
3.7 Explain the main functions and procedures of S1AP signaling protocol
3.8 Explain the main functions and procedures of the signaling protocol GTP-C

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4 Explain the L2 transport protocols PDCP, RLC, MAC and GTP-U Protocols
4.1 Explain the PDCP functions and services such as header compression and ciphering
4.2 Explain the RLC functions.
4.3 List the different modes of RLC (transparent, unacknowledged and acknowledged mode) and explain the structure of the PDU involved in these cases
4.4 Explain the MAC functions such as HARQ, BCH Reception, PCH reception
4.5 Explain the MAC architecture, its entities and their usage for the mapping of transport channels
4.6 List the contents of the MAC Packet Data Unit (PDU)
4.7 Explain the main functions and procedures of the transport protocol GTP-U

5 Explain Mobility in LTE
5.1 Explain the Intra-Frequency Handover (X2 and S1 Handover)
5.2 Discuss Coverage Triggered Session Continuity
5.3 Explain Inter-Frequency Handover
5.4 Explain IRAT Handover
5.5 Describe CS Fallback
5.6 Discuss Single Radio Voice Call Continuity (SRVCC) Handover to UTRAN/GERAN/CDMA1x
5.7 Explain VoLTE and WiFi Calling Mobility

Target audience

The target audience for this course is:

Service Design Engineer, Network Design Engineer, Service Engineer

Prerequisites

Successful completion of the following courses:

LTE L18 Air Interface, LZU1082699

Duration and class size

The length of the course is 4 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	EPS Architecture	3
	Explain the LTE/SAE Quality of Service and Security	3
2	Explain NAS and RRC protocols	6
3	Explain X2/S1 Interface, X2AP/S1AP and GTP-C protocols	1
	Explain PDCP, RLC and MAC protocols	5
4	Explain MAC protocol (continued)	1
	Explain Mobility in LTE	5

LTE L18 Radio Network Functionality

LZU1082701 R1A

Description

Do you want to have full and detailed understanding of the Ericsson E-UTRAN general functionality? If so, the LTE L18 Radio Network Functionality course will give you that.

This course describes the Idle Mode Behavior, how Radio Connection Supervision is carried out, Power Control calculations, settings and functions as well as Link Adaptation and basic scheduling behavior. Also, the basic Admission Control and Mobility functionality will definitely boost your competence and understanding of the Ericsson E-UTRAN solution.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the logical architecture of E-UTRAN and introduce Radio Functionality
1.1 Detail the logical architecture of the Ericsson E-UTRAN
1.2 List the Radio Functionality supported in the Ericsson E-UTRAN

2 Describe the purpose and function of Idle Mode Behavior
2.1 Explain PLMN and Cell selection and reselection
2.2 Explain location and TA updating procedures
2.3 Explain paging procedures
2.4 Describe system information

3 Explain the purpose and function of Radio Connection Supervision
3.1 Explain how the radio connection supervision is carried out
3.2 Explain how in-synch and out-of-synch is determined by the radio link monitoring algorithm in the RBS

4 Describe the purpose and use of the function Power Control, Link Adaptation and basic Scheduling
4.1 Explain the interaction between Power Control, Link Adaptation and Scheduling
4.2 Explain open loop power control for initial access
4.3 Configure the power of common channels
4.4 Explain uplink power control for PUSCH and PUCCH
4.5 Detail DL-SCH processing using MIMO

5 Describe the purpose and function of basic Capacity Management
5.1 Describe the interaction between the Monitored System Resources (MSRs) and the

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different algorithms
5.2 Explain the static and dynamic MSRs
5.3 Explain basic Admission Control

6 Explain the concepts of LTE Mobility
6.1 Explain X2 and S1 Handover
6.2 Detail what type of events trigger measurement reports to be sent to the eNB
6.3 Describe the purpose of the handover evaluation algorithm and Best Cell Evaluation
6.4 Explain IF and IRAT mobility
6.5 Explain CS Fallback
6.6 Explain VoLTE and WiFi Mobility

Target audience

The target audience for this course is:

Service Design Engineer, Network Design Engineer.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview, LZU1087020

LTE L18 Air Interface, LZU1082699

LTE L18 Protocols and Procedures, LZU1082693

Duration and class size

The length of the course is 3 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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 of the course and Radio Network Solution	2.0
	Idle Mode Behavior	3.0
	Radio Connection Supervision	1.0
	Scheduling	1.5
2	Power Control	1.0
	Link Adaptation	1.5
	MIMO processing and feedback	2.0
	Basic Capacity Management	0.5
3	X2 and S1 Handover	2.0
	IF and IRAT Mobility	2.0
	CS Fallback	1.0
	Explain VoLTE and WiFi Mobility	0.5

LTE Overview - WBL

LZU1082394 R1A

Description

What is Long Term Evolution (LTE)? What is the Evolved Packet Core (EPC) Architecture? How does the LTE air interface produce user bit rates? How is LTE evolving to meet the demands of the networked society? This Web-Based Learning (WBL) course provides an insight into the LTE 4G technology. This tutorial will give you a basic knowledge about the LTE/EPC Architecture and Radio Interface. You will also learn about the evolution of LTE as specified by the 3GPP.

Learning objectives

On completion of this course the participants will be able to:

1 Give an overview of LTE/EPC architecture & terminology
1.1 Explain the nodes that make up the Evolved Packet System (EPS)
1.2 Describe the EPC Quality of Service (QoS)
1.3 Explain the EPS Bearer concept
1.4 Describe how mobility is supported in the EPS

2 Explain the basics of the LTE radio interface
2.1 Describe Orthogonal Frequency-Division Multiplexing (OFDM)
2.2 Describe Single Carrier Frequency Division Multiple Access (SC-FDMA)
2.3 Explain adaptive coding, modulation and MIMO are used in LTE
2.4 Explain how LTE downlink and uplink user bit rates are achieved

3 Give an overview of the evolution of LTE
3.1 List the main contents of the 3GPP releases from R99 to R15
3.2 Describe the highlights of LTE Advanced
3.3 Describe the highlights of LTE Advanced Pro
3.4 List the main objectives for 5G according to 3GPP release 15

Target audience

This course is suitable for anyone who is required to be familiar with LTE 4G technology.

Prerequisites

Successful completion of the following courses:

None

Duration and class size

The length of the course is 40 minutes and the maximum number of participants per session is 1

Learning situation

This is a web-based interactive training course with multimedia content.

LTE/SAE System Overview

LZU1087020 R17A

Description

If you want to know what LTE/SAE (Long Term Evolution / System Architecture Evolution) is, this course will give you an overview of the new radio technology and protocols involved in the E-UTRAN (Evolved UTRAN, also referred to as LTE) and the architecture behind EPC (Evolved Packet Core, also referred to as SAE – System Architecture Evolution). The course also provides descriptions of the CPP hardware platform, operation and maintenance and RBS hardware.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the background and architecture of E-UTRAN and EPC
1.1 Describe the evolution of cellular networks
1.2 Summarize the evolution of 3GPP releases, from release 99 to release 14
1.3 Explain the logical architecture of EPS and the interworking with other technologies
1.4 Explain the EPS bearer concept and give an overview of the LTE QoS framework

2 Describe the EPC Architecture
2.1 Describe the interfaces in EPS
2.2 Describe the Evolved Packet Core (EPC)
2.3 Describe the role of the MME, S-GW and PDN-GW

3 Describe the E-UTRAN Architecture
3.1 List the functionality of the eNodeB
3.2 Describe the radio interface techniques; OFDM and SC-FDMA and the physical bit rates
3.3 Discuss Link Adaption in LTE
3.4 Describe the basic principles of MIMO
3.5 Explain the concept of Advanced Carrier Aggregation
3.6 Describe the RBS 6000 Hardware for LTE
3.7 Describe the Ericsson Radio System
3.8 Explain Heterogeneous Network
3.9 Outline on overview level the security in LTE
3.10 Describe the different type of synch in LTE

4 Describe key LTE Solutions
4.1 Explain the options for Voice; CS Fallback and VoLTE
4.2 Describe the LTE Broadcast Service, eMBMS

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4.3 Explain Location services

5 Explain the various LTE mobility scenarios
5.1 Describe LTE idle mode mobility
5.2 Detail Intra LTE connected mode mobility; handovers and session continuity
5.3 Explain IRAT Handover scenarios

6 Describe the Operation & Maintenance logic in LTE Radio Access Network
6.1 Identify the need for different levels of management and its tools
6.2 List the various O & M areas in LTE RAN
6.3 Explain the concepts related to Smart Simplicity and Self-Organizing Networks (SON)

7 Describe the road to 5G
7.1 Describe some use cases for 5G and their radio solutions
7.2 Describe Cloud solution
7.3 Explain v-RAN ideas

Target audience

The target audience for this course is:

System Engineer, Service Design Engineer, Network Design Engineer,

Prerequisites

Successful completion of the following courses:

A general knowledge in cellular systems and radio technology.

Duration and class size

The length of the course is 2 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	LTE/SAE Introduction	2
	EPC Architecture	2
	E-UTRAN Architecture	2
2	Describe key LTE Solutions	2
	Explain the various LTE mobility scenarios	1
	LTE Operation and Maintenance	2
	The road to 5G	1

Ericsson Internet of Things Overview

LZU 1082656- R1A

Description

Ericsson Internet of Things Overview training provides theoretical knowledge of selected aspects of IoT. The objective of this course is to make the participants familiar with IoT concept on the high level and be able to understand the IoT Accelerator place in the ecosystem. This course is the prerequisite for IoT Accelerator hands on training.

Target audience

Course is intended for people who want to gain the basic knowledge about IoT. It is an introduction to IoT Accelerator related topics.

Learning objectives

On completion of this course the participants will know:

1. What is IoT?
2. Market forecast
3. A market with exponential growth
4. The IoT value chain
5. IoT Value Layers
6. Access connectivity
7. Access requirements
8. Use case diversity
9. Use case requirements
10. Standardization advantages
11. 3GPP solutions
12. Technology characteristics
13. LTE Evolution leads to 5G
14. Meeting diversity of use cases requirements
15. EPC solution
16. IoT Enabling platform
17. IoT Use Case examples

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Learning situation

This course is given as web-based learning.

Duration and class size

The length of the complete course is 1 hour. Each participant will receive separate login and password to Ericsson LMS and the instructions how to access the e-learning.

EPG 1 Operation, Configuration and Troubleshooting

LZU1082499 R1A

Description

The Evolved Packet Gateway (EPG) 1 includes new functions for Serving Gateway (SGW), Packet Data Network Gateway (PGW) and GPRS Gateway Support Node (GGSN). EPG 1 can be deployed both as a native node and as a Virtual Network Function (VNF) included in Ericsson's vEPC solution.
This course is recommended for those who want to build competence in configuring, operating and troubleshooting both native and virtual EPG 1. EPG 1 Operation, Configuration and Troubleshooting course helps participants to understand day to day operations, configuring the EPG SSR system and EPG VNF, its interfaces, routing and security management.
Furthermore, participants learn about methods and tools available in EPG to troubleshoot and rectify issues quickly and effectively.

Learning objectives

On completion of this course the participants will be able to:

1 Review the basic concepts of EPG and its architecture
1.1 Explain the functions and services provided by the EPG, with concepts such as bearer activation and session Management procedures
1.2 Explain the native EPG System architecture in terms of platform and application software
1.3 Discuss the hardware EPG architecture and list the different cards supported in SSR 8020 and SSR 8010
1.4 Explore the new line card supporting 200 GB capacity and the second generation switch cards introduced in EPG 1
1.5 Explain the latest enhancement/features available in EPG 1

2 Discuss Ericsson's Virtual EPG 1 architecture in cloud solution
2.1 Discuss high level vEPC architecture and key features of vEPC Solution like IoT, distributed MBB Broadband
2.2 Detail the role of Ericsson Cloud Execution Environment (CEE) and Ericsson Cloud Manager (ECM)
2.3 Explain the vEPG architecture and its deployment in cloud architecture
2.4 Elaborate the resilience mechanism available in virtual EPG
2.5 Describe high level network configurability for virtual EPG
2.6 Outline the failure handling in vEPG1

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3 Explain and perform basic Operations for native and virtual EPG 1
3.1 Explain the basic IPOS software components
3.2 Navigate through EPG CLI and configure basic system properties
3.3 Discuss the EPG configuration flows and command mode hierarchy
3.4 Configuring cards, management port and administrator access in EPG
3.5 Show how to monitor basic system operations
3.6 Discuss logging mechanisms available for identifying faults in EPG
3.7 Explain Event Base Monitoring (EBM) for performance monitoring and troubleshooting in EPG
3.8 Run through various toolbox commands available to monitor and troubleshoot EPG
3.9 Illustrate how UE Trace and ITC trace is useful in troubleshooting

4 Perform platform related configurations such as context creation, routing and security in native and virtual EPG
4.1 Explain the concept of contexts, bindings and interfaces in EPG
4.2 Configure physical interfaces such as port, VLAN tagging in EPG
4.3 Perform configurations related to routing such as protocols, metrics and links
4.4 Show different security configurations available on EPG such as packet filtering and Access Control Lists (ACLs)

5 Configure EPG services like SGW & PGW Interfaces, APN, Radius, QoS and charging related Configuration
5.1 Explain the functionalities of the serving gateway and steps to configure the SGW Interfaces like S11, S5, S8 ,S4 and S1-U
5.2 Administer the configurations involved to configure the PDN gateway and the interfaces involved such as Gn, S5/S8, and SGi
5.3 Illustrate how to perform Access Point Names (APNs), Radius, QoS and charging related confirmation for the EPG

6 Identify Operation & Maintenance procedures on native and virtual EPG 1
6.1 Run commands to view new alarms related to the EPG running in the serving & PDN gateway role
6.2 Execute commands for displaying status information on the EPG running EPC services
6.3 Describe the EPG toolbox (Support Package, EPG versions, EPG Health check KPIs, UE Trace tools) and enhanced ITC trace functionality
6.4 Explain the software management and backup procedure in EPG

7 Introduction to EPG/vEPG tools available for troubleshooting
7.1 Discuss logging mechanisms available for identifying faults in EPG
7.2 Explain Event Base Monitoring (EBM) for performance monitoring and troubleshooting in EPG
7.3 Run through various toolbox commands available to monitor and troubleshoot EPG
7.4 Illustrate how UE Trace and ITC are used in troubleshooting

Target audience

The target audience for this course is:

Network Design Engineer, Network Deployment Engineer, System Technician, System Engineer, System Administrator

Prerequisites

Successful completion of the following courses:

EPC System Survey - LZU1087977
EPG 1 Overview - LZU1089270

For Virtual EPG:
Virtual EPC (vEPC) Overview - LZU1082264
Ericsson Cloud System Overview - LZU1089909
Foundation Series - Ericsson Cloud Execution Environment (CEE) - LZU1082364

Duration and class size

The length of the course is 4 days and the maximum number of participants is 8.

Learning situation

This is an Instructor Led Training (ILT) course based on theoretical and practical instructor-led lessons given both in a classroom and technical environment, using equipment and tools which can be accessed remotely

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	EPG Introduction	4
	EPG Architecture	2
2	CLI Basics	2
	Platform Level Configurations	2
	Exercises	2
3	EPG Services Configurations	2
	Operation & Maintenance	2
	Exercises	2
4	EPG Troubleshooting	3
	Exercises	3

Packet Core Enhancements for Internet of Things (IoT)

LZU1082568 R1A

Description

Do you want to know about the enhancements introduced in the Ericsson Virtual Evolved Packet Core (vEPC) relating to Internet of things (IoT) technology? This course is ideal for the technical staff who need to update their knowledge on the IoT features and enhancements introduced in SGSN-MME, EPG and SAPC. Participants will explore the configuration activities in IoT and review the IoT related protocols and interfaces. The course focuses on IoT processes which take place between the eNB and MME, between MME and SGW, between MME and HSS and between SAPC and EPG.

The course describes details of the Ericsson Packet Core IoT solution, which is based on new 3GPP standard technologies including NB-IoT, Cat-M1 and EC-GSM-IoT.

The course also explains the interaction between the IoT Accelerator and the Packet Core and provides an overview of the Ericsson Network Manager (ENM) and of the Core Network Operations Manager (CNOM).

Learning objectives

On completion of this course the participants will be able to:

1 Describe the Virtual Evolved Packet Core (vEPC)
1.1 Explain the Internet of Things (IoT) solution.
1.2 Outline the vEPC deployments.
1.3 List the IoT Value Packages.

2 Outline some virtual application categories in an IoT environment.
2.1 Review the Ericsson CEE main categories.
2.2 Describe the Ericsson ECM main categories.
2.3 Explain the resilience and scaling in vEPG, vMME and vSAPC.

3 Explain the main IoT processes on the interfaces Gb and S1-MME and show configuration activities such as feature activation and the configuration needed in the context of the feature.
3.1 Explain the IoT/M2M low complexity UE Support and the handling of NB-IoT RAT
3.2 Outline the extended coverage concept in GSM and LTE
3.3 Describe the UE Power Saving Mode (PSM) for GSM and for LTE
3.4 Outline the Extended Idle Mode Discontinuous Reception (eDRX) in LTE and in GSM
3.5 Explain the configurable battery saving. Describe the lower bound for periodic TAU

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timer
3.6 Outline the adaptive paging and the High Latency Communication (HLCOM)

4 Explain the main IoT processes on the interfaces S11, S1-U, S5/S8, SGs and Gx and show configuration activities such as feature activation and the configuration needed in the context of the feature.
4.1 Explain the RAT Type NB-IoT and the S11-U Data over NAS (DoNAS) support in EPG
4.2 Describe the Non-IP based DoNAS and the DoNAS Short Message (SMS) Support over the SGs Interface
4.3 Outline the DDN Throttling in MME and EPG
4.4 Explain the Virtual Service Forwarder (VSFO)
4.5 Describe the Dedicated Core Network (DECOR)
4.6 Outline the SGW GTP-C load control information from SGW to MME
4.7 Explain the main vSAPC improvements.

5 List the main operation, fault management, performance management and basic troubleshooting activities in a IoT environment.
5.1 Explain the fault management.
5.2 List the main log files.
5.3 Describe the main troubleshooting toots, such as UE Trace, Integrated Traffic Capturing (ITC) and Event-Based Monitoring (EBM).

6 Describe the overall functionality of the Ericsson Network Manager (ENM) support for vMME, vEPG and vSAPC.
6.1 List the features of the Application Launcher
6.2 Describe the main tools of ENM.
6.3 Explain at a high level the ENM features for Fault Management (FM) and Performance Management (PM) and Configuration Management (CM)
6.4 List the networks elements supported by ENM
6.5 Explain the advantages of the Core Network Operation and Maintenance (CNOM)

Target audience

The target audience for this course is:

Network Design Engineer, Network Deployment Engineer, System Technician, System Engineer, System Administrator

Prerequisites

Successful completion of the following courses:

SGSN-MME 1 Administration LZU1082498
SGSN-MME 1 Configuration & Troubleshooting LZU1082501
EPG 1 Operation, Configuration & Troubleshooting LZU1082499
SAPC 1 Operation, Configuration and Troubleshooting LZU1082500
Foundation Series - Ericsson Cloud Execution Environment (CEE)- LZU1082364
Internet of Things (IoT) Overview - LZU1082344

Duration and class size

The length of the course is 3 days and the maximum number of participants is 16.

Learning situation

The course is based on theoretical instructor-led lessons given in classroom environment

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 and IoT Value Packages	3
1	IoT processes configuration	3
2	IoT processes configuration	6
3	IoT processes configuration	3
3	IoT operation, fault management, performance management and basic troubleshooting tools.	3

SAPC 1 Operation, Configuration and Troubleshooting

LZU1082500 R1A

Description

Mobile broadband is taking off and moving forward to LTE era and Cloud Solutions. It is very important to understand the Fair Usage Policy Control, QoS, Access Policy Control and VoLTE traffic cases. You may need to operate and configure the main equipment in order to manage all these new characteristics using a Classical SAPC or a virtual SAPC.

The SAPC 1 Operation and Configuration course is recommended for those who are working with operation and configuration tasks related to the SACC solution. It defines how SAPC provides centralized policy management for access control and QoS control per subscriber, service and bearer basis according to the 3GPP Policy Charging and Control (PCC) architecture. This course includes the main operation, maintenance and configuration activities in release 1 using both Physical Node Function (PNF) and/or VNF (Virtual Node Function).

Learning objectives

On completion of this course the participants will be able to:

1 Describe the SAPC solutions.
1.1 Explain the SAPC 1 reference model.
1.2 Describe the SAPC main functions.
1.3 Explain the SAPC interfaces and their protocols.
1.4 Describe the main features in SAPC release 1.

2 Describe the SAPC architecture
2.1 Describe the classical SAPC 1 architecture.
2.2 Describe the virtual SAPC 1 architecture.

3 List the main operation activities in SAPC 1
3.1 Execute the SAPC Operation: logging management, fault management, performance management.
3.2 Work on OAM tools for SAPC.
3.3 Interpret the CM connection and GUI in SAPC
3.4 Explain the SAPC backup and restore

4 Describe the SAPC 1 configuration.
4.1 Operate and perform the SAPC 1 configuration
4.2 Modify rules and conditions in the SAPC
4.3 Create services (static, dynamic) in SAPC to be installed in PCEF
4.4 Explain the Policy Studio.

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5 Describe the main SAPC troubleshooting activities.
5.1 Explain the non-graphical tools available for troubleshooting.
5.2 Describe the main log files when troubleshooting.

Target audience

The target audience for this course is:

Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, System Administrator

Prerequisites

Successful completion of the following courses:

For the Classical SAPC:

- EPC System Survey LZU1087977
- BSP 8100 Operation & Maintenance, LZU1089779
- Basic knowledge on Unix, Cisco SCE, Cisco BRAS and Juniper CRAS configurations or equivalents

For the Virtual SAPC:

- Virtual EPC Overview LZU1082264
- Ericsson Cloud System Overview LZU1089909
- Foundation Series – Ericsson Cloud Execution Environment (CEE) LZU1082364
- Basic knowledge on Unix, Cisco SCE, Cisco BRAS and Juniper CRAS configurations or equivalents

Duration and class size

The length of the course is 3 days and the maximum number of participants is 8.

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in a technical environment using equipment and tools, which are accessed remotely.

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 SAPC	3
	SAPC Architecture	3
2	SAPC Operation	3
	SAPC Configuration	3
3	SAPC Configuration	4
	SAPC Troubleshooting tips	2

SGSN-MME 1 Administration

LZU1082498 R1A

Description

SGSN-MME 1 can be deployed both as a native node as well as Virtual Network Function (VNF)
The SGSN-MME 1 administration course provides participants competence to operate and maintain both native and virtual SGSN-MME 1 efficiently. If you are interested to know how to perform operation and administration activities like fault management, security management, software management and performance management on both native and virtual SGSN-MME, then this is the right course for you.
The course also illustrates Ericsson's virtual SGSN-MME architecture and its deployment in cloud solution.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the main procedures in SGSN-MME
1.1 Recognize the basic SGSN-MME architecture, its functions and interfaces
1.2 Outline the functionality of SGSN-MME in different implementations
1.3 Describe basic procedures handled by SGSN-MME such as session management, mobility management and Quality of Service (QoS) handling
1.4 Recognize some general call flows handled by SGSN-MME in GPRS and EPC Networks
1.5 Explain the highlighted features of SGSN-MME 1

2 Describe the details of native SGSN-MME System Architecture
2.1 Explain the software architecture of SGSN-MME MKVIII and MkX
2.2 Understand the hardware architecture of SGSN-MME MKVIII and MkX and its different components
2.3 Introduce the automatic health check function in SSGN-MME and its components

3 Discuss the virtual SGSN-MME architecture in cloud solution
3.1 Introduce the concept of cloud and virtualization
3.2 Identify the main elements in cloud solution
3.3 Understand high level vEPC architecture and its key features
3.4 Describe the vSGSN-MME 1 as a Virtual Network Function (VNF)
3.5 List the benefits of virtual SGSN-MME

4 Explain the resilience in native and virtual SGSN-MME 1
4.1 Discuss the session resilience and redundancy mechanisms available in native and

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virtual SGSN-MME

4.2 Explain the procedure of Application Processor (AP) takeover and Device Processor (DP) takeover
4.3 Outline the failure handling in vSGSN-MME
4.4 Identify automatic recovery functions and overload protection mechanisms in SGSN-MME
4.5 Describe the Traffic Mix Optimization (TMO) functionality

5 Explain the various management domains in SGSN-MME and how to handle fault management procedures
5.1 Identify the Operation and Maintenance (O&M) architecture and various management domains in SGSN-MME
5.2 Perform fault management on SGSN-MME using Command Line Interface (CLI)
5.3 Identify the severity of a fault in the SGSN-MME and act according to the escalation procedure
5.4 Describe the concept of log management in SGSN-MME

6 Perform the configuration management in SGSN-MME
6.1 Explain how to perform basic node management using CLI
6.2 Explore configuration management domain using ALEX and CLI

7 Execute the performance management tasks in SGSN-MME
7.1 Review the concepts of performance management types and create performance management jobs and understand their practical use
7.2 Explain Event Based Monitoring (EBM) feature for performance monitoring

8 Conduct the security management tasks in SGSN-MME
8.1 Explain the concepts of security management, perform basic security management, perform user management and assign tailored roles for different users

9 Illustrate the software management tasks in SGSN-MME and virtual SGSN-MME 1 deployment procedure
9.1 Perform systems administration tasks on the SGSN-MME
9.2 Identify different ways of handling software configurations and create software configurations
9.3 Describe enhanced SGSN-MME software upgrade procedure
9.4 Discuss the virtual SGSN-MME deployment procedure
9.5 Describe SGSN-MME license management

10 Explain the support systems for managing native and virtual SGSN-MME 1
10.1 Describe the key functions of the OSS/ENM in managing native and virtual SGSN-MME
10.2 Understand and run the updated backup and restore procedure in SGSN-MME
10.3 Identify the various tools available in OSS/ENM for software management, fault management and performance management

Target audience

The target audience for this course is:

Network Deployment Engineer, Service Deployment Engineer, System Technician, Service Technician, System Engineer, Service Engineer, Field Technician, System Administrator

Prerequisites

Successful completion of the following courses:

EPC System Survey - LZU1087977

For Virtual SGSN-MME:
Virtual EPC Overview - LZU1082264
Ericsson Cloud System Overview - LZU1089909
Foundation Series - Ericsson Cloud Execution Environment (CEE)- LZU1082364

Duration and class size

The length of the course is 4 days and the maximum number of participants is 8.

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in a technical environment using equipment and tools, which are accessed remotely.

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	2
	Native SGSN-MME architecture	2
	Virtual SGSN-MME architecture	2
2	Resilience	1
	Fault Management & Log Management	3
	Configuration Management	2
3	Security Management	3
	Performance Management	3
4	Software Management	3
	Support functions	3

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LZU1082501 R1A

Description

SGSN-MME 1 can be deployed both as a native node, with support for MkVIII/MkX platform to secure high capacity needs and as a Virtual Network Function (VNF) included in Ericsson's virtual Evolved Packet Core (vEPC) solution.
If you want to build competence in configuring, operating and troubleshooting both native and virtual SGSN-MME 1, then this is the right course for you. Several configuration areas related to all interfaces; DNS, NTP, Wi-Fi integration and virtual SGSN-MME implementation, are covered for a comprehensive insight.
Furthermore, this course provides methods and guidelines to troubleshoot SGSN-MME and rectify issues quickly and effectively.

Learning objectives

On completion of this course the participants will be able to:

1 Review the basic concepts of packet core network and the role of SGSN-MME
1.1 Explain the role of SGSN-MME in the GPRS and EPC networks
1.2 Identify SGSN-MME interfaces and protocols used
1.3 Discuss basic mobility management and session management procedures
1.4 List the highlighted features of SGSN-MME 1
1.5 Introduce the common configuration related to SGSN-MME

2 Explain the software and hardware configuration of native SGSN-MME
2.1 Explain the software architecture of native SGSN-MME using MKVIII and MkX Hardware
2.2 Discuss the hardware architecture of native SGSN-MME MKVIII and MkX and its different components
2.3 List the various Plug In Unit (PIU) roles in SGSN-MME

3 Discuss Ericsson's virtual SGSN-MME 1 architecture in a cloud solution
3.1 Determine the high level vEPC architecture and key features of vEPC Solution like IoT, distributed Mobile Broadband (MBB)
3.2 Describe the virtual SGSN-MME 1 architecture
3.3 Review the role of Ericsson's Cloud Execution Environment (CEE) and Ericsson Cloud Manager (ECM)
3.4 Discuss the virtual SGSN-MME implementation in cloud architecture

4 Describe the concept of IP services and the routing mechanisms used for IP over Ethernet configuration in native and virtual SGSN-MME

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4.1 Introduce the concept of IP services and usage of service IP address in the concerned networks
4.2 Explain the concept of DSCP marking
4.3 Explain the routing methods and protocols supported in native SGSN-MME and virtual SGSN-MME 1
4.4 Outline high level network configurability for virtual SGSN-MME 1
4.5 Review the packet filtering rules and policies
4.6 Configure the external interfaces based on IP/ETH
4.7 Configure static and dynamic routing protocols

5 Configure and maintain the Gb over IP interface
5.1 Explain the concept, advantages and network impact of Gb over IP
5.2 Explain the concept of dynamic configuration for Gb over IP and related procedures
5.3 Configure and verify Gb over IP interface

6 Configure non-SCTP based interfaces like Gom, Gn, S3, S4, S11, S10, U2 and U1a
6.1 Explain the functionality of Gom, Gn, S11, S10, S3, S16, S4,U2 and U1a interfaces
6.2 Outline the usage of IP addresses in Gn, S11, S10, S3, S1,S4 ,U2 and U1a related networks

7 Configure and maintain SCTP based Interface S1-MME, SGs and SBc
7.1 Explain the concept of the control plane (S1-MME) and user plane (S1-U) in S1 interface
7.2 Explain the S1-AP and NAS procedures
7.3 State the SCTP usage in S1-MME interface
7.4 Configure and verify S1-MME interface
7.5 Outline the functionality of SBc and SGs Interface
7.6 Configure and verify the SBc and SGs interfaces

8 Configure diameter-based interfaces in SGSN-MME like S6a, Sx and S13
8.1 Explain diameter protocol and diameter configurations
8.2 Describe the functionality of S6a, S13 and Sx interface and the protocol used
8.3 Explain the signaling procedures performed in the S6a, S13 and Sx interface
8.4 Indicate the usage of SCTP in the S6a interface
8.5 Configure and verify S6a, S13 and Sx Interface

9 Configure Domain Name Service (DNS) and Network Time Protocol (NTP) connectivity in SGSN-MME
9.1 State the concept of using DNS and configure DNS
9.2 Explain the usage of NTP in the network and configure NTP

10 Explain troubleshooting methods and tools available in SGSN-MME
10.1 Discuss Event Based Monitoring (EBM) functionality and the usage of EBM logs for troubleshooting mobility and session management related issues
10.2 Run through the various toolbox commands available in SGSN-MME useful for troubleshooting
10.3 Resolve subscriber related issues with CLI commands and UE trace functionality
10.4 Identify and troubleshoot interface faults using CLI commands and Integrated Traffic Capture (ITC) trace

Target audience

The target audience for this course is:

System Engineer, Network Design Engineer, Network Deployment Engineer, Service Planning Engineer

Prerequisites

Successful completion of the following courses:

EPC System Survey - LZU1087977
SGSN-MME 1 Administration - LZU1082498

For virtual SGSN-MME:
Virtual EPC Overview - LZU1082264
Ericsson Cloud System Overview - LZU1089909
Foundation Series - Ericsson Cloud Execution Environment (CEE)- LZU1082364

Duration and class size

The length of the course is 5 days and the maximum number of participants is 8.

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in a technical environment using equipment and tools, which are accessed remotely.

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	3
	SGSN-MME Architecture	1.5
	Virtual SGSN-MME	1.5
2	IP services and IP over Ethernet configuration	2
	Routing solution in MkVIII and MkX	2
	Configuring Gb Interface	1
	Configuration of non-SCTP based interfaces	1
3	Configuration of S1-MME interface	3
	SBc and SGs interface Configuration	3
4	Configuration of Diameter based interfaces like S6a, Sx and S13	4
	DNS and NTP Configuration	2
5	SGSN-MME Troubleshooting	6

NB-IoT System Techniques

LZU1082581 R2A

Description

Do you know how Narrowband IoT is realized? The Internet of Things (IoT) is foreseen to be an important driver for digitalization and the next technology revolution. To address the massive IoT market, the Low Power Wide Area Netowrk uses some new functionalities standardized in 3GPP. One of the main solutions is Narrowband IoT or NB-IoT. This course explains the details of the Narrow Band-IoT (NB-IoT) technology. It presents how NB-IoT is implemented, its characteristics, features, air interface, protocols and capacity considerations.

Learning objectives

On completion of this course the participants will be able to:

1 Explain the concept of Massive IoT
1.1 Discuss the IoT market situation
1.2 Compare the different types of Machine-Type Communication (MTC)
1.3 Describe the Massive IoT technologies
1.4 List the requirements and characteristics for MIoT devices
1.5 Underline the NB-IoT network architecture and the protocols

2 Detail the NB-IoT solution
2.1 Explain the NB-IoT Air Interface
2.2 Describe the NB-IoT Features and related parameters
2.3 Explain the NB-IoT Standalone, Inband and Guardband Deployment Modes
2.4 Detail the Signal Flow for Attach and Data Transfer procedures

3 Explain the Operation and Maintenance (O&M) in NB-IoT
3.1 Detail the NB-IoT Standalone, Inband and Guardband Deployment Modes configuration
3.2 Explain the Core Network Related Configuration
3.3 Describe NB-IoT Fault Management
3.4 Explain how to handle licenses in NB-IoT
3.5 Describe NB-IoT Observability

4 Underline the typical use cases and capacity considerations
4.1 Identify the typical use cases for NB-IoT
4.2 Discuss the use cases' requirements
4.3 Describe the dimensioning capacity considerations

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Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer, Network Design Engineer, Network Deployment Engineer, Service Deployment Engineer, System Engineer, Service Engineer

Prerequisites

Successful completion of the following courses:

Internet of Things (IoT) Overview - LZU1082344
LTE RAN L18 Radio Network Functionality

Duration and class size

The length of the course is 2 days and the maximum number of participants is 16.

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment.

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	1
	NB-IoT functionality	5
2	Operation and Maintenance	4
	Use cases and capacity	1,5
	Conclusion	0,5