LEARNING SERVICES

Long Term Evolution Radio Access Network L11

Training Programs

Catalog of Course Descriptions

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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.

Service delivery is supported using various delivery methods including:

Icon	Delivery Method
	Instructor Led Training (ILT)
	Virtual Classroom Training (VCT)
	eLearning (WBL)
	Workshop (WS)
	Short Article (SA)
	Structured Knowledge Transfer (SKT)
	mLearning
	Job duty analysis (JDA)
	Competence GAP Analysis (CGA)

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CDMA-LTE Interworking and coexistence

LZU1087715 R1B

Description

This course provides a framework for CDMA to LTE interworking in radio network point of view. CDMA engineers could learn LTE concepts with ease through comparison diagrams between CDMA and LTE. Radio issues like interference, antenna Tx/Rx co-existence, and link budget are explained. To consolidate the understanding of the explained topics, RF calculation exercises are explained.
The course also provides descriptions of signal-to-noise ratio, power requirements and radio coverage.

Learning objectives

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

1 Explain the background and architecture of CDMA2000
1.1 Compare common control and overhead channels - CDMA vs 1xEV-DO
1.2 Describe the radio interface techniques used in uplink and downlink
1.3 Describe the channel structure of the radio interface
1.4 Compare 1xRTT and 1xEV-DO coding and modulation for high data rates

2 Describe RF inter-working scenarios
2.1 Highlight the RRM characteristics among CDMA, 1xEV-DO, and LTE
2.2 Explain IRAT session continuity and handover
2.3 Describe Search windows and intersystem synchronization
2.4 Explain Operation of measurements of 1xEV-DO for IRAT purposes
2.5 Describe Ncell planning during mobility

3 Illustrate RF characteristics among CDMA, 1xEV-DO, and LTE
3.1 Describe BTS Tx and Rx performance
3.2 Describe UE Tx and Rx performance
3.3 Explain RF emissions
3.4 Explain Channel Plans
3.5 Compare Synchronization requirements - GPS vs NTP server
3.6 Explain impact of RF hardware characteristics on SISO and MIMO performance including data fill issues

4 Describe Antenna Tx/Rx co-existence and interference
4.1 Review Rx blocking, Tx noise and inter-modulation issues
4.2 Explain Inter-band & Inter-technology interference issues including examples from practical experience in different parts of the world
4.3 Review various antenna isolation scenarios (Vertical vs Horizontal separation, and X

polarization)
4.4 Describe Ancillary combining equipment - filters, combiners & TMAs
4.5 Provide discussion of repeaters at a high level
4.6 Give examples of managing intersystem isolation to maintain performance
4.7 Calculate isolation and filter characteristic requirements

5 Describe Performance Characteristics
5.1 Perform Link Budget comparison
5.2 Discuss the impact of Tx power and SINR in LTE performance and coverage
5.3 Discuss RF cell planning and design aspects for 3GPP2 vs LTE
5.4 Highlight differences in tuning and optimization requirements for 3GPP2 vs LTE

Target audience

The target audience for this course is:

The target audience for this course is: Network Engineer, Service Engineer, Service Design Engineer, and 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 both theoretical lessons and practical exercises given in a classroom environment.

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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	Background and architecture of E-UTRAN and EPC	1
	RF inter-working scenarios	3
	RF characteristics of CDMA, 1xEV DO and LTE	2
2	Antenna co-existence and interference	3
	Performance characteristics	3

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KPIs in LTE/SAE Network

LZU1087713 R2C

Description

How can the performance of the Ericsson LTE/SAE network be monitored? What Key Performance Indicators (KPIs) are used for Long Term Evolution (LTE) and Evolved Packet Core (EPC) nodes? How are evolved NodeB (eNodeB), Serving Gateway (SGW) and Mobility Management Entity (MME) counters used to create KPI formulas?
This 'KPIs in LTE/SAE Network' course will allow students to become familiar with using counters from eNodeB, SGW and MME nodes to create KPI formulas to measure network Accessibility, Retainability, Integrity, Mobility and Availability performance.
The knowledge gained in this 'KPIs in LTE/SAE Network' course will enable Engineers to efficiently measure the performance of the LTE/SAE Network and make more efficient use of their time during network optimization.

Learning objectives

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

1 Explain Evolved Packet System (EPS) Architecture.
1.1 Explain the terms EPS, LTE, E-UTRAN, SAE, and EPC.
1.2 Explain the LTE UE states and EPS bearer concept.
1.3 Describe the functionality of the EPS nodes.

2 Create LTE KPIs using eNodeB counters.
2.1 Describe the eNodeB counter types and structures.
2.2 Use Ericsson CPI documentation to explain eNodeB counters.
2.3 Use eNodeB counters to create LTE KPI formulas.

3 Create EPC KPIs using SGW counters.
3.1 Describe the SGW counter types and structures.
3.2 Use Ericsson CPI documentation to explain SGW counters.
3.3 Use SGW counters to create EPC KPI formulas.

4 Create EPC KPIs using MME counters.
4.1 Describe the MME counter types and structures.
4.2 Use Ericsson CPI documentation to explain MME counters.
4.3 Use MME counters to create EPC KPI formulas.

Target audience

The target audience for this course is:

Service Planning Engineers, Service Design Engineers, Network Design Engineers, System Engineers and Service Engineers.
This audience is responsible for LTE/SAE Optimization.

Prerequisites

Successful completion of the following courses:

The participants should be familiar with Radio Access Network performance management and have a basic knowledge of Microsoft Excel.

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 with practical exercises using Microsoft Excel.

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 Network Introduction	2
	LTE KPIs using eNodeB Counters	4
2	EPC KPIs using SGW Counters	3
	EPC KPIs using MME Counters	3

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LTE Evolution, Advantages in Feature and Applications

LZU1087714 R1B

Description

Are you ready to introduce LTE/SAE (Long Term Evolution/System Architecture Evolution)? We will give you a kick-start on how to handle the different business aspects covering both opportunities and challenges for LTE/SAE.
The impact of introducing LTE/SAE on existing networks is examined and different network considerations related to Radio, Transport and Core are presented.
A high level LTE/SAE network overview is provided as an introduction.

Learning objectives

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

1 Have LTE/SAE overview
1.1 Explain the evolution of cellular networks GSM, WCDMA, CDMA, TD-SCDMA
1.2 Name different driving factors behind LTE/SAE
1.3 Have high level understanding of LTE radio fundamentals
1.4 Explain the architecture of EPS (E-UTRAN and EPC)
1.5 List a selection of more important key LTE/SAE features

2 Discuss LTE/SAE Business Environment
2.1 Explore current Market outlook
2.2 Identify key business challenges
2.3 Get familiar with various end user services and trends
2.4 Distinguish different revenue and price models
2.5 Explore various LTE device concepts

3 Examine LTE/SAE Network Considerations
3.1 Discuss general Network Deployment Aspects
3.2 Outline different Radio Network Considerations
3.3 Outline different Transport Network Considerations
3.4 Outline different Core Network Considerations
3.5 Have a high level understanding of Voice over LTE

Target audience

The target audience for this course is:

Business Developer and Fundamentals.

This audience is typically working in Marketing and Sales or as Operation Managers.

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 and theoretical exercises given in a classroom environment.

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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 overview and evolution of Cellular Networks	1
	Driving factors behind LTE/SAE	1
	LTE Radio fundamentals	1
	Architecture of EPS (E-UTRAN and EPC)	0.5
	LTE/SAE Business aspects: Market Outlook and Market Trends	1
	Key Business Challenges	0.5
	End User Services, Applications and Devices	0.5
	Revenue and pricing models	0.5
2	Network Deployment considerations	0.5
	Radio Network Considerations	0.5
	Transport Network Considerations	1
	Core Network Considerations	1
	Exercise	2
	Summary and Conclusion	1

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LTE L11 Access Transport Network Dimensioning

LZU1087908 R2A

Description

How is the Ericsson LTE L11 Access Transport Network dimensioned? What are the types of traffic carried by LTE and how are they affected by transport network capacity? What transport network overheads need to be considered and how are these incorporated into dimensioning calculations? How is the Ericsson RBS 6000 hardware dimensioned for the LTE transport interfaces?
With the help of the LTE L11 Access Transport Network Dimensioning course the attendees will learn about the type of traffic that is carried by LTE and how the Access Network dimensioning is carried out according to the latest Ericsson recommendation. They will also learn how the RBS6000 node hardware and transport interfaces are dimensioned for LTE. This new competence is tested on sample dimensioning exercises at the end of the course so that the students leave with competence in the area of LTE Access Transport Network dimensioning.

Learning objectives

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

1 Describe the EPS architecture and interfaces
1.1 List the interfaces in the EPS (Evolved Packet System)
1.2 Explain the EPS protocol stacks for user and control plane

2 Describe the different types of traffic carried by LTE networks
2.1 List the protocols that support the various LTE traffic types
2.2 Explain the operation of TCP, UDP, HTTP and FTP Internet Protocols
2.3 Explain the issues surrounding Voice over LTE.

3 Explain the IP Functionality of the L11 LTE RAN Transport Network
3.1 Identify the structure of IPv4 and IPv6 packets
3.2 Explain the structure of the Ethernet frames used in the LTE Transport Network
3.3 Explain IPSec and VLAN routing and how they impact dimensioning
3.4 Explain how IP and Ethernet Quality of Service (QoS) is implemented in LTE

4 Perform LTE link dimensioning
4.1 Recognize terms and concepts related to LTE link dimensioning
4.2 Describe the Ericsson recommended LTE link dimensioning process
4.3 Perform Transport Network overhead calculations
4.4 Perform last mile and mobile backhaul dimensioning

5 Perform RBS6000 node hardware and transport interfaces dimensioning for LTE

5.1 Identify the RBS6000 hardware for LTE
5.2 Dimension the RBS6000 node hardware and transport interfaces for LTE

Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineers, Network Design Engineer.

Prerequisites

Successful completion of the following courses:

LTE L11 Air Interface	LZU1087897
LTE L11 Protocols and Procedures	LZU1087898
LTE L11 Radio Network Functionality	LZU1087899
LTE L11 Network Design	LZU1087900

Duration and class size

The length of the course is 1 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.

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Time schedule

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Day	Topics in the course	Estimated Time (hours)
1	EPS Architecture and Interfaces	1
	LTE Traffic	1
	LTE IP Transport Network Functionality	1
	LTE Link Dimensioning (including exercise)	2
	LTE Node Dimensioning (including exercise)	1

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LTE L11 Air Interface

LZU1087897 R2A

Description

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. Mobility, 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 Describe the evolution of cellular networks
1.2 Summarize the evolution of 3GPP releases, from release 99 to release 8
1.3 Describe the radio interface techniques
1.4 Explain the difference between the FDD and TDD mode
1.5 Describe the flexible spectrum usage
1.6 Explain the concepts of channel coding and FEC (Forward Error Correction)
1.7 Describe the principle for OFDM

2 Detail the Radio Interface structure and signaling
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 Detail the time-domain structure in the radio interface in UL and DL for both FDD and TDD mode
2.5 Detail the downlink transmission technique
2.6 Have a good understanding of the OFDM principle, signal generation and processing
2.7 Detail the reference symbols in DL
2.8 Detail the DL control signaling and formats
2.9 Detail the paging procedures
2.10 Explain HARQ
2.11 Explain the cell search procedure
2.12 Detail the uplink transmission technique

2.13 Have a good understanding of the SC-FDMA principle, signal generation and processing
2.14 Explain the pros and cons with OFDM and SC-FDMA
2.15 Detail the UL control signaling and formats
2.16 Detail the random access procedure
2.17 Describe the Power Control in UL
2.18 Describe the concepts of layers, channel rank, spatial multiplexing, open and closed loop spatial multiplexing, TX diversity, beamforming, SU-MIMO and MU-MIMO

3 Describe the Radio Resource and Mobility Management
3.1 Describe UL and DL Scheduling principles and signaling
3.2 Explain the scheduler interactions with other functions
3.3 Explain the concepts of dynamic and semi-persistent scheduling
3.4 Describe intra-LTE mobility in ECM-CONNECTED and ECM-IDLE mode
3.5 Explain the concept of event triggered periodical reporting
3.6 Describe the mobility measurements

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, LZU 108 7020

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 and theoretical exercises given in a classroom environment.

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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, Radio Interface general principles	4
	Radio Interface Structure and signaling	2
2	Radio Interface Structure and signaling continued	6
3	Radio Interface Structure and signaling continued	4
	Radio Resource & Mobility Management	2

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LTE L11 Configuration

LZU1087903 R2A

Description

Are you now ready to configure your own LTE radio access network? What needs to be done at the RBS site, how would the tools in OSS-RC be used and what do the configuration files look like?

LTE L11 Configuration describes how an RBS6000 is configured in the L11 version of LTE RAN. The course includes both theoretical sessions describing what need to be configured, and practical sessions during which the configurations are made. Configurations are carried out step by step using OSS-RC's Base Station Integration Manager (BSIM) and the RBS Element Manager.

After the course, participants will be familiar with the difference between manual- and autointegration procedures, understand the structures and contents of configuration files that are required during the integration of the RBS, including the impact of IpSec support during the integration. The Mul-, S1- and X2- interfaces, including basic radio network configurations are made during the training.

Learning objectives

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

1 Explain LTE L11 interfaces and the integration of RBS6000
1.1 Describe the interfaces S1, X2 and Mul to an eNodeB in LTE L11
1.2 Identify the main differences between various RBS6000 products, such as RBS6101, RBS6102, RBS6201, RBS6202 and RBS6601
1.3 Summarize the integration process of an RBS6000 and differentiate between the manual integration and auto integration procedures
1.4 Identify the tools that are used in the different steps of the integration procedure
1.5 Explain what the Managed Object Model (MOM) is, why it is important in configuration and where to find information about it

2 Configure the Transport and Radio Network in RBS6000
2.1 Relate the IP and Ethernet functionality to the L11 RAN Transport Network
2.2 Describe the hardware used to support IP/Ethernet transmission in RBS6000
2.3 List the various ways Network Synchronization reference may be realized for a RBS6000

2.4 Recognize the Managed Objects related to the Mul- , the S1- and X2-interfaces implementation, and how some key attributes implement the transport network functionalities
2.5 Explain the concept of cell and its relation to sector and antennae system in RBS6000
2.6 Recognize the Managed Objects related to radio network configuration
2.7 Identify some basic parameters related to cell and cell relations
2.8 Edit BSIM templates in the OSS-RC to be used during configuration
2.9 Perform the on-site integration of an RBS6000 manually with the Site Installation file, the Site Basic file and the Site External file
2.10 Configure the Transport Network and Radio Network using both manual and autointegration procedures
2.11 Identify, and, if necessary, change QoS related parameters in RBS6000

3 Understand the impact of IpSec during the Transport Network Configuration in RBS6000
3.1 Explain what IP Security (IpSec) is and how it is supported in the LTE RAN
3.2 Recognize Managed Objects related to IpSec implementation and the some key attributes that define the working of IpSec
3.3 State how the configuration files would be affected with IpSec in the LTE RAN
3.4 Identify how the configuration procedure would be affected by having IpSec in the RBS6000

Target audience

The target audience for this course is:

The target audience for this course is: Service Planning Engineer, Service Design Engineer and Network Design Engineer

Prerequisites

Successful completion of the following courses:

LTE L11 Operation	LZU1087902
LTE L11 Air Interface	LZU1087897

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

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classroom and in a technical environment using equipment and tools.

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 and introduction of LTE/SAE, the integration procedure of an RBS6000 and the Managed Object Model	1,5
	Transport Network Configuration theory	3
	Radio Network Configuration theory	1,5
2	Manual on-site configuration of the RBS6000	1
	Configuration of the S1 and X2 interfaces	1,5
	Configuration of the Radio Network and QoS	1,5
	Impact of IpSec	1,5
	Summary of the course	0,5

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LTE L11 eNode B Commissioning

LZU1087901 R1B

Description

Do you need to understand how to integrate the LTE eNode B, RBS 6000 from a site perspective?
This course provides the participants with hands-on experience of the procedures that need to be performed for the commissioning and integration of the eNode B.

Learning objectives

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

1 Describe the LTE system from an overview level
1.1 Describe from an overview level the RBS 6000 platform and hardware
1.2 Explain the integration steps of RBS 6000

2 Explain the concept of Management Tools
2.1 Use the Element Manager (EM)
2.2 Use the Command Line Interface (CLI)
2.3 Configure the client to connect to the RBS

3 Perform commissioning and integration of the RBS
3.1 Power up the RBS
3.2 Check the RBS status
3.3 Connect the clients
3.4 Select integration scenario
3.5 Auto-integrate RBS using site installation files
3.6 Integrate the RBS manually
3.7 Monitor the RBS integration
3.8 Verify external alarms
3.9 Check hardware status
3.10 Perform test calls
3.11 Complete and store integration reports

Target audience

The target audience for this course is:

Network Deployment Engineer, Field Technician and System Technician.
This audience is responsible for configuration of the eNode B.

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Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview	LZU1087020
RBS6000 Overview	LZU1087503
Or	
LTE/SAE Overview, WBL	LZU1087318
RBS 6000 in a Nutshell, WBL	LZU1087504

Duration and class size

The length of the course is 1 day 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.

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	0.5
	eNode B Management Applications	0.5
	eNode B Integration (theory and practical exercises)	5

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LTE L11 Initial Tuning

LZU1087906 R1B

Description

When starting up your new LTE network, initial tuning is the most powerful way to verify the performance.
With the help of the LTE L11 Initial Tuning course the attendees will learn the mechanisms involved in the initial tuning process. We will define the theoretical formulas and processes, as well as analyze data according to the KPI's wanted.

Learning objectives

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

1 Explain the process for LTE RAN tuning
1.1 Describe the difference between tuning and optimization
1.2 Describe the different steps in the tuning process

2 Perform the Preparations necessary for a tuning exercise
2.1 Perform a network design review and consistency check
2.2 Define cluster and drive test routes
2.3 Define the services to test
2.4 Perform the setup of the drive test tools

3 Perform CELL tuning
3.1 Describe the different interference scenarios in a LTE network
3.2 Describe the interfrequency interference ratio, F
3.3 Define coverage in different scenarios e.g. macro and hotspot
3.4 Implement changes to improve coverage
3.5 Describe the neighbor list with or without the Automated Neighbor Relations

4 Perform UE tuning
4.1 Explain Accessibility formulas (KPI) and analysis of the data from drive test
4.2 Explain Retainability formulas (KPI) and analysis of the data from the drive test
4.3 Explain Integrity formulas (KPI) and analysis of the data from the drive test
4.4 Explain Mobility formulas (KPI) and analysis of the data from the drive test

Target audience

The target audience for this course is:

System Engineers, Service Engineers

Prerequisites

Successful completion of the following courses:

LTE L11 Air Interface	LZU1087897
LTE L11 Protocols and Procedures	LZU1087898
LTE L11 Functionality	LZU1087899

Duration and class size

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

Learning situation

The course is based on theoretical and practical instructor-led lessons given in both classroom and in a technical environment using equipment and tools.

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 process of tuning	3
	Perform preparations necessary for the tuning	3
2	Cell tuning	3
	Perform a Network and UE tuning	3

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LTE L11 Operation

LZU1087902 R1B

Description

Do you have sufficient skills to operate your Long Term Evolution (LTE) radio access network?
This course covers common operational tasks in the LTE radio network that NOC and OMC personnel come across in their daily work. Hardware, Software, Configuration, Fault and Performance Management concepts are covered. Practical exercises, based on work-order like instructions, contribute to the understanding of LTE network operations. OSS-RC tools and Element Management tools relevant for LTE are used where applicable.

Learning objectives

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

1 Explain the LTE network architecture and the Operation and Maintenance (O&M) support
1.1 Describe the nodes that build up LTE/SAE
1.2 on an overview level the O&M infrastructure
1.3 the Operation and Maintenance architecture of an RBS6000 and where to find documentation about the Managed Object Model

2 Perform Hardware and Software Management on a LTE RAN
2.1 Explain the hardware building practice of RBS6000 (MPE, DUL, RUL) and which ways O&M connectivity can be established to the node
2.2 export and handle hardware and software resources in an RBS6000 via OSS-RC and EMAS
2.3 the file system in an RBS6000
2.4 the Configuration Version concepts
2.5 Configuration Versions and file system using OSS-RC, EMAS, COLI and AMOS
2.6 the Upgrade process for a batch of RBS6000 nodes

3 Perform Fault Management on a LTE RAN
3.1 Explain the Fault Management Model
3.2 the Fault Management process in the LTE RAN
3.3 some common alarms by following Procedural Information, and using OSS (Alarm List Viewer, Alarm Log Browser and Alarm Status Matrix), AMOS and EM in the process
3.4 the function of the command line interface (CLI) and Node Command Line Interface (NCLI)

4 Perform Performance Management on the LTE RAN
4.1 Describe what Observability of the LTE RAN means and how this is related to Key Performance Indicators
4.2 the E-UTRAN PM solution
4.3 the performance statistics generated in the LTE RAN (Counter collection, Cell Traffic Recording, User Equipment Traffic Recording)
4.4 the Subscription Profile principle
4.5 an overview of statistics and recording concepts in the LTE, and use the OSS-RC to initiate UE Tracing
4.6 what streaming events are and collect these events in OSS-RC

5 Perform basic RBS6000 Configuration procedures using OSS-RC and Element Manager
5.1 Describe the main steps in RBS6000 Integration
5.2 Radio Network Handling in OSS-RC
5.3 familiar with the different ways configuration could be performed and changed in an RBS6000, and perform a parameter change using EM, AMOS and BCM

Target audience

The target audience for this course is:

System Engineers and Service Engineers.
This audience is responsible for operation of the LTE RAN, most likely from a Network Management Center or OMC.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview	LZU1087020
RBS6000 Overview	LZU1087503
Or	
LTE/SAE Overview (WBL)	LZU1087318
RBS 6000 in a Nutshell (WBL)	LZU1087504

Duration and class size

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

Learning situation

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

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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	Network architecture and LTE features	1
	RBS6000 Hardware and Software concepts and related OSS-RC tools	3
	Operational exercises (ALEX library and MOM documentation familiarization)	0.5
	Operational exercises (HW and SW management)	1.5
2	Operational exercises (HW and SW management) continued	1.5
	Fault Management	1
	Operational exercises (Fault management)	2
	LTE Performance Management	1
	Operational exercises (Performance Management)	0.5
3	LTE Configuration Management	1
	Operational exercises (Configuration Management)	3
	Operational exercises summary	1
	Course summary	1

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LTE L11 Performance Management and Optimization

LZU1087905 R2A

Description

How are eNodeB counters used to monitor the performance of the LTE network? How are these counters collected and stored? What are the Key Performance Indicators (KPI) for the LTE network? What are the parameters that influence these KPIs? What is contained in LTE Cell and UE Trace and how are they handled by the Ericsson OSS-RC?
This 'LTE L11 Performance Management and Optimization' course will allow students to become familiar with using eNodeB counters to create KPI formulas to measure E-UTRAN Accessibility, Retainability, Integrity, Mobility and Availability performance and the parameters that may be used to optimize these areas.
Through practical exercises they will learn how to use the Ericsson OSS-RC to collect counters from the eNodeB, setup and decode LTE Cell and UE Trace and produce user defined performance reports using ENIQ.

Learning objectives

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

1 Explain the E-UTRAN Performance Management solution
1.1 Describe the difference between Initial Tuning and Optimization
1.2 Identify how eNodeB counters are collected and stored
1.3 Describe the eNodeB counter types and structures

2 Measure LTE Accessibility performance
2.1 Describe the E-RAB setup procedure and associated counters
2.2 Use eNodeB counters to create E-RAB Accessibility KPIs
2.3 Explain the eNodeB parameters that influence Accessibility

3 Measure LTE Retainability performance
3.1 Describe the E-RAB release procedure and associated counters
3.2 Use eNodeB counters to create E-RAB Retainability KPIs
3.3 Explain the eNodeB parameters that influence Retainability

4 Measure LTE Integrity performance
4.1 Explain the counters that are used to measure LTE Radio Bearer LTE throughput
4.2 Use eNodeB counters to create E-UTRAN Integrity KPIs
4.3 Explain the eNodeB parameters that influence Integrity

5 Measure LTE Mobility performance
5.1 Explain the various LTE mobility procedures and associated counters
5.2 Use eNodeB counters to create E-UTRAN Mobility KPIs

5.3 Explain the eNodeB parameters that influence Mobility

6 Measure LTE Cell Availability
6.1 Explain the counters that are used to measure LTE Cell Availability
6.2 Use eNodeB counters to create Cell Availability KPIs and measure System Utilization
6.3 Explain the eNodeB parameters that influence Cell Availability and System Utilization

7 Explain briefly how LTE Cell and UE Trace are collected and stored

8 Use the OSS-RC to collect E-UTRAN counters and handle LTE Cell and UE Trace
8.1 Create, activate and delete subscription profiles
8.2 Use the OSS-RC to open and view the contents of LTE Cell and UE Trace files

9 Explain the ENIQ and Business Objects (BO) Web Intelligence Rich Client operation
9.1 Use Business Objects (BO) Web Intelligence Rich Client to open and refresh Ericsson predefined LTE performance reports
9.2 Create user defined LTE performance reports using the Business Objects (BO) Web Intelligence Rich Client
9.3 Share user defined LTE performance reports with other ENIQ users

Target audience

The target audience for this course is:

Service Planning Engineers, Service Design Engineers, Network Design Engineers, System Engineers and Service Engineers.

This audience is responsible for LTE Performance Management and Optimization.

Prerequisites

Successful completion of the following courses:

LTE L11 Air Interface	LZU1087897
LTE L11 Configuration	LZU1087903
LTE L11 Protocols and Procedures	LZU1087898
LTE L11 Functionality	LZU1087899
LTE L11 Troubleshooting	LZU1087904

The students should also have a basic knowledge of Microsoft Excel.

Duration and class size

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

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Learning situation

This course is based on theoretical and practical instructor-led lessons given in both a classroom and 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	LTE Performance Management Introduction	2
	LTE Accessibility Optimization	2
	LTE Retainability Optimization	2
2	LTE Integrity Optimization	2
	LTE Mobility Optimization	2
	LTE Availability Optimization	2
3	LTE Cell and UE Trace	1
	OSS-RC Statistics, Cell and UE Trace Handling	2
	ENIQ and Business Objects	3

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LTE L11 Protocols and Procedures

LZU1087898 R1B

Description

This course covers the LTE RAN protocols and procedures. It gives an in-depth understanding of the LTE Systems radio access network architecture and signaling, as well as the EPS Bearer Service, End-to-End service from QoS aspects. It covers the LTE radio access interfaces, such as X2 and S1.and corresponding controlling protocols X2AP and S1AP.
Also covered in this course are theL3 and L2 protocols used over these interfaces: NAS, RRC, GTP-U and PDCP, RLC, MAC and the physical layer for the radio interface.
Security aspects are also explained such as Authentication and Security Key generation.
The purpose of the course is to enable the students to understand complete traffic case in EPS including CS Fallback.

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 purpose of EPS Bearer Services and eUTRA Radio Bearer
2.2 List the different attributes of the eUTRA 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 L3 Signaling Protocols
3.1 Explain the purpose with Non Access Stratum NAS protocol
3.2 Explain the functions and services of NAS such as Authentication.
3.3 Explain the interaction between RRC and the lower layers in the control plane
3.4 Explain the RRC Service States and the difference between connected and idle mode
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.

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 X2 Handover
5.2 S1 Handover
5.3 IRAT Handover
5.4 Explain CS Fall Back for Dual Radio UEs

Target audience

The target audience for this course is:

Service Design Engineer, Network Design Engineer, System Engineer.

Prerequisites

Successful completion of the following courses:

The participants should be familiar with radio interface solution for LTE or successful completion of the following course:
LTE L11 Air Interface LZU 108 7897

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 and theoretical exercises given in a classroom environment

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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 the NAS and RRC protocols	4
	Explain the X2/S1 Interface, X2AP/S1AP and GTP-C protocols	2
3	Explain the PDCP, RLC and MAC protocols	3
	Explain the GTP-U protocol	0.5
	Explain Mobility in LTE	2.5

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LTE L11 Radio Network Design

LZU1087900 R2A

Description

What is the 3GPP Long Term Evolution (LTE) strategy for the UMTS Network? How does Orthogonal Frequency Division Multiplexing (OFDMA) and Single-Carrier Frequency Division Multiple Access (SC-FDMA) used in the evolved UMTS Terrestrial Radio Access Network (eUTRAN) produce data rates in excess of 100 Mbps? What types of traffic are carried by the LTE Network? How is the coverage and capacity of an LTE cell calculated? How is the LTE Radio Network implemented with Ericsson hardware?

This LTE L11 Network Design course introduces attendees to the concepts of LTE and the operation of OFDMA and SC-FDMA. With this knowledge they will be guided through the LTE Radio Network dimensioning process and given the opportunity to perform sample LTE dimensioning exercises. They will also be introduced to the TEMS CellPlanner LTE module and the hardware that supports the Ericsson LTE L11 network.

Learning objectives

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

1 Explain the reasons behind the 3GPP Long Term Evolution (LTE) strategy for UMTS.
1.1 Explain the general dimensioning principles

2 Perform calculations on the radio interface capacity
2.1 Explain how the LTE downlink and uplink data rates are achieved and calculated.
2.2 List the LTE UE category capabilities.
2.3 Explain radio wave propagation and typical channel models

3 Describe the different types of traffic carried by LTE networks.
3.1 Explain the protocols that support the various LTE traffic types.
3.2 Explain the operation of TCP, UDP, HTTP and FTP Internet Protocols.
3.3 Explain the issues surrounding Voice over LTE.

4 Explain the Ericsson LTE dimensioning process.
4.1 Perform uplink and downlink coverage and capacity calculations for LTE FDD and TDD.
4.2 Perform Control Channel dimensioning
4.3 Perform Tracking Area planning
4.4 Perform Paging Capacity calculations
4.5 Explain which tools are used in radio network dimensioning

4.6 Apply subscriber and traffic growth scenarios and perform dimensioning exercise
4.7 Recommend sites for LTE deployment to meet coverage and capacity requirements set by the customer

5 Perform analysis of co-location and co-existence scenarios
5.1 Explain on overview level the transmitter interference characteristics.
5.2 Explain Adjacent Channel Leakage Ratio (ACLR) and spurious emissions.
5.3 Describe the receiver interference characteristics
5.4 Explain Adjacent Channel Selectivity (ACS) and receiver blocking.
5.5 Explain Adjacent Channel Interference Ratio (ACIR).
5.6 Explain the co-location and co-existence and problems that may occur

6 Explain the tools and hardware associated with LTE cell planning.
6.1 Explain the downlink and uplink analysis supported by the TEMS CellPlanner LTE module.
6.2 List the Ericsson products in the RBS 6000 family.
6.3 Explain the hardware structure and capabilities of the RBS 6201 and 6102.

Target audience

The target audience for this course is:

The target audience for this course is: Service Planning Engineers, Service Design Engineers and Network Design Engineers.

This audience is responsible for the dimensioning and design of the LTE Radio Access Network.

Prerequisites

Successful completion of the following courses:

LTE L11 Air Interface	LZU1087897
LTE L11 Protocols and Procedures	LZU1087898
LTE L11 Radio Network Functionality	LZU1087899

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 with practical exercises using a calculator or PC.

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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
	General dimensioning principles	1
	Radio interface capacity	0.5
	Traffic types and protocols	1
	LTE dimensioning	2.5
2	LTE dimensioning	3
	Co-location and co-existence	2
	LTE cell planning	1

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LTE L11 Radio Network Functionality

LZU1087899 R2A

Description

Do you want to have full and detailed understanding of the Ericsson E-UTRAN features and functionalities? If so, the LTE L11 Radio Network Functionality course will give you all 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 scheduling behavior. Also, the Capacity Management 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 registration updating procedures
2.3 Explain paging procedures
2.4 Describe the organization of 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 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 Explain the impact of TDD
4.6 Explain the impact of MIMO

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

5.2 Explain the static and dynamic MSRs
5.3 Explain Admission Control
5.4 Explain Congestion Control
5.5 Explain the interaction with QoS

6 Explain the purpose and function of Intra-LTE Mobility, Inter-Radio Access Technologies (IRAT) Mobility and IRAT and Inter Frequency Session Continuity
6.1 Explain Intra LTE Handover
6.2 Explain Coverage Triggered Session Continuity
6.3 Describe the interworking with GRAN
6.4 Describe the interworking with UTRAN
6.5 Describe the interaction with CDMA2000
6.6 Distinguish between release with redirect and handover
6.7 Detail what type of events trigger measurement reports to be sent to the eNB
6.8 Describe the purpose of the handover evaluation algorithm and Best Cell Evaluation
6.9 Explain CS Fallback
6.10 Describe the UE positioning

7 Explain the purpose and function of Automated Neighbor Relations (ANR)
7.1 Explain the detection and adding of external RBS
7.2 Explain the detection and adding of external cells
7.3 Explain the detection and adding of cell relations
7.4 Explain the detection and adding X2 connections

8 Future functionality

Target audience

The target audience for this course is:

The target audience for this course is: Service Design Engineers and Network Design Engineers.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview	LZU1087020
LTE L11 Air Interface	LZU1087897
LTE L11 Protocols and Procedures	LZU1087898

Duration and class size

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

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Learning situation

This course is based on theoretical instructor-led lessons and theoretical exercises 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	1
2	Idle Mode Behavior	2.5
	Radio Connection Supervision	1
	Link Adaptation	1.5
	Power Control	1
	Scheduling	1
	Capacity Management	0.5
	Mobility	1.5
	Automated Neighbor Relations (ANR)	1
	Future Functionality	1

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LTE L11 Troubleshooting

LZU1087904 R2A

Description

While configuring and operating an L11 based LTE RAN network, what are the common faults, how are they detected and solved in a RBS 60000 node? How does Ericsson local/field support enable and collect logs from a RBS6000 node?

LTE L11 Troubleshooting explains how a fault is detected, the different types of logs in a RBS6000 and how logs are collected to be appended to Customer Service Requests (CSRs). Alarm handling procedures and tools are covered, together with the procedure for initiating performance recordings and statistics in the process of working with troubleshooting a problem. Verification of connectivity issues and emergency recovery concepts are also explained, making it ideal for operation and maintenance personnel. Customer Product Information (CPI) in ALEX is used as much as possible during the training.

Learning objectives

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

1 Describe and use the different troubleshooting tools for in LTE RAN
1.1 List and use tools available at the RBS site which are available for troubleshooting the RBS
1.2 Identify tools in the OSS-RC are useful for troubleshooting the LTE RBS
1.3 Distinguish between Cell Trace and UE Trace support and be able to activate these traces

2 Explain the emergency recovery procedure of an RBS and collect data while creating Customer Service Requests (CSRs)
2.1 Understand the Ericsson support process
2.2 Explain what Data Collection Guideline (DCG) is, and apply commands to gather mandatory inputs while writing CSRs
2.3 Brose through and appreciate the various logs that RBS provides while troubleshooting
2.4 List and explain the functions of the various files that make up a Configuration Version (CV)
2.5 Recover a RBS6000 from an emergency cyclic restart state, and from a different CV

3 Discuss and perform system level troubleshooting concepts
3.1 Describe which interfaces that the RBS provides

3.2 Check O&M connectivity on the Mul interface
3.3 Expand and act on Alarms
3.4 Verify the Network Synchronization status
3.5 Differentiate between the various states of Managed Objects
3.6 Relate counter values to RBS's performance
3.7 Discuss various end-to-end system performance issues
3.8 Execute commands to check S1 connectivity

Target audience

The target audience for this course is:

System Engineers, Service Engineers, Field Technicians.

This audience is responsible for RBS6000 in a LTE environment, including troubleshooting and emergency handling of the node.

Prerequisites

Successful completion of the following courses:

LTE L11 Air Interface	LZU1087897
LTE L11 Configuration	LZU1087903
LTE L11 Protocols and Procedures	LZU1087898
LTE L11 Functionality	LZU1087899

Duration and class size

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

Learning situation

This is a task-oriented learning course based on tasks in the work-process given in a technical environment using equipment and tools.

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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	0.5
	Troubleshooting tools	1
	RBS6000 Hardware structure	1
	Troubleshooting tools Exercises	2
	RBS Recovery and Data Collection Guideline	1.5
2	RBS Recovery and Data Collection Guideline Exercises	2
	RBS6000 interfaces (S1/X2/Mul)	1
	System view troubleshooting	1
	System view Exercises	2

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LTE/SAE in Nutshell

LZU1087417 R1A

Description

Do you want to know what LTE/SAE is all about. This eLearning course will give you on overview on end user experience of Long Term Evolution (LTE) in terms of services and applications, speed and capacity as well as network setup. The course will also highlight the mobile technology evolution. The course content is a simple explanation of the next generation technology with a focus on a non technical target audience.

Learning objectives

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

1 What is LTE/SAE?
2 How fast is LTE?
3 What is included in the Mobile Technology Evolution?
4 What is the end user experience?
5 What are possible services and application?
6 What is the speed and capacity?
7 Is it better than 3G?
8 How much does it cost?
9 Do I need a new phone?
10 Is the coverage and mobility better then today?
11 How does LTE/SAE work?
12 Which Frequencies are used?
13 Which nodes are included in the Radio Network?
14 Which nodes are included in the Core Network?
15 What is the meaning of the typical LTE related abbreviations?

Target audience

The target audience for this course is:

System Technicians,

Service Technicians,
Field Technicians,
System Administrators,
Application Developers,
Business Developers,
Customer Care Administrators.
The main focus of this course is on non technical personnel.

Prerequisites

Successful completion of the following courses:

None

Duration and class size

The length of the course is 1 hour.

Learning situation

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

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LTE/SAE System Overview

LZU1087020 R5A

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 8
1.3 Explain the logical architecture of EPS (E-UTRAN and EPC)
1.4 Give an overview of the 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
2.4 Describe the S1 (and X2) protocol stacks
2.5 Explain the interaction with IMS on an overview level

3 Describe the E-UTRAN principles
3.1 List the radio interface protocols
3.2 Describe the radio interface techniques used in uplink and downlink
3.3 Describe the channel structure of the radio interface
3.4 Explain the OFDM principle and benefits
3.5 Detail the reference symbols in UL & DL
3.6 Describe the basic principles of MIMO
3.7 Describe the RBS hardware in LTE

4 Describe O&M (Operation and Maintenance) for EPS
4.1 Describe the impact of EPC on the Ericsson OSS-RC
4.2 Explain the concepts related to Smart Simplicity, Self Organizing Networks (SON), RBS Autointegration, Automated Neighbor Relations (ANR)
4.3 Describe the overall role and function of OSS-RC

Target audience

The target audience for this course is:

Network Engineer, Service Engineer, Service Design Engineer, Network Design Engineer.

Prerequisites

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 and theoretical exercises 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, LTE/SAE Introduction	3
	EPC Architecture	3
2	Radio Interface principles	3
	Operation and Maintenance and RBS HW	3

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LTE/SAE– System Overview, WBL

LZU 108 7318 R2A

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).

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
1.3 Describe the flexible spectrum usage

2 Describe the EPS Architecture
2.1 Explain the logical architecture of EPS (E-UTRAN and EPC)
2.2 Give an overview of the interfaces in EPS
2.3 Describe the radio interface techniques
2.4 Explain the difference between the FDD and TDD mode
2.5 Detail the terminal states
2.6 Describe the Evolved Packet Core
2.7 Describe the role of the MME and the S-GW
2.8 Detail the S1 and X2 interfaces and their protocol stacks

3 Describe the Air Interface
3.1 Explain the radio interface structure
3.2 Detail the channel structure of the radio interface
3.3 Describe the physical signals in UL and DL
3.4 Detail the time-domain structure in the radio interface in UL and DL for both FDD and TDD mode
3.5 Detail the downlink transmission technique
3.6 Have a good understanding of the OFDM principle, signal generation and processing
3.7 Detail the reference symbols in DL
3.8 Detail the control signaling in DL
3.9 Detail the uplink transmission technique
3.10 Have a good understanding of the SC-FDMA principle, signal generation and processing
3.11 Explain the pros and cons with OFDM and SC-FDMA
3.12 Detail the control signaling in UL

3.13 Describe the concepts of layers, channel rank, spatial multiplexing, SU-MIMO and MU-MIMO
3.14 Detail the Radio Resource Management and Mobility
3.15 Describe the Radio Resource Management
3.16 Describe UL and DL scheduling and signaling
3.17 Explain the concepts of dynamic and persistent scheduling
3.18 Describe LTE Mobility
3.19 Describe intra-LTE mobility in ECM_CONNECTED and ECM_IDLE mode
3.20 Explain inter-working with 2G/3G

Target audience

The target audience for this course is:

Network Engineer
Service 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 3 hours.

Learning situation

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

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RBS 6000 in a Nutshell

LZU1087504 R1A

Description

This WBL course is intended to give the participant an overview of the RBS 6000 series. Are you interested in the latest RBS technology from Ericsson. The RBS 6000 Overview course will guide you thought the concept and explain you the main benefits of the new architectures. You will learn how the multi-standard concept is implemented, more room for expansion is generated and how you can lower the power consumption of your network for greater sustainability.

Learning objectives

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

1 Describe on an overview level the RBS 6000 Platform

2 Describe the generic building and form structure used in RBS 6000

3 Describe on an overview level the building practice

4 Explain the advantages of multi-standard RBS

5 Describe how more room for expansions is generated

6 Compare the power consumption of a RBS 6000 to today's technologies

7 Understand how WCDMA is implemented in the RBS 6000
7.1 Describe on block level which boards and units gives the WCDMA Functionality

8 Understand how LTE is implemented in the RBS 6000
8.1 Describe on block level which boards and units gives the LTE Functionality

9 Understand how GSM is implemented in the RBS 6000
9.1 Describe on block level which boards and units gives the GSM Functionality

Target audience

The target audience for this course is:

System Technician
Service Technician
System Engineers
Service Engineers

ERICSSON

Prerequisites

The participants should be familiar with the WCDMA, GSM and LTE on overview level.

Duration and class size

The length of the course is 1 hour.

Learning situation

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

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WCDMA to LTE L11 Delta

LZU1087907 R1B

Description

Are you currently working with Operation and Configuration in the area of WCDMA RAN but soon moving into the LTE world?

"WCDMA to LTE L11 Delta" course targets the delta you need to know when it comes to tools, procedures, RBS6000 O&M support, Managed Objects etc. If you are familiar with IP configuration in WCDMA, you will know how to integrate an eNodeB from scratch after this course. If you know how to use the OSS-RC toolbox towards WCDMA nodes before the course, you are able to manage LTE eNodeB's afterwards.

Participants attending this course are not expected to attend "LTE L11 Operation" and "LTE L11 Configuration". Student books/exercises for those courses are used as student material in this course.

Learning objectives

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

1 Explain the LTE network architecture and the Operation and Maintenance support
1.1 List the functions of the nodes that build up LTE/SAE
1.2 Summarize the Operation and Maintenance infrastructure in LTE RAN
1.3 Describe the Operation and Maintenance architecture of an RBS6000 and locate correct documentation related to O&M in the Customer Product Information (CPI)

2 Perform Hardware and Software Management on a LTE RAN
2.1 Explain the hardware building practice of RBS6000 (MPE, DUL, RU) and which ways O&M connectivity can be established to the node

3 Integrate an RBS6000
3.1 Detail the integration procedure of an RBS6000
3.2 Prepare files and perform on-site integration of an RBS6000 manually with the Site Installation file, the Site Basic file and the Site External file with and without IpSec
3.3 Use Base Station Integration Manager (BSIM) to configure Transport Network carrying S1 and X2 user plane and control plane traffic to an RBS6000
3.4 Configure the Radio Network in an RBS6000
3.5 Identify, and if necessary, make changes to Managed Objects related to QoS parameters in RBS6000
3.6 Distinguish between manual integration and autointegration

4 Perform Performance Management on the LTE RAN
4.1 Describe what Observability of the LTE RAN means and how this is related to Key Performance Indicators
4.2 Differentiate between the various performance data generated in the LTE RAN (statistics, Cell Trace, UE Trace Recording)
4.3 Explain what streaming events are and initiate their collection in OSS-RC

Target audience

The target audience for this course is:

Service Planning Engineer, Service Design Engineer and Network Design Engineer.

The particiapnts are already familiar with operation and configuration in WCDMA RAN.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview	LZU1087020
LTE L11 Air Interface	LZU1087897

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.

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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	Network architecture and RBS6000 O&M and HW/SW concepts compared to the RBS3000 platform	2
	O&M tools support for LTE RAN (EM, COLI and the OSS toolbox)	2
	O&M tools support for LTE - exercises	2
2	Autointegration of a new eNodeB	2
	Integration of a new eNodeB - exercises	2
	LTE Performance Management support	1
	LTE Performance Management - exercises	1

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