Long Term Evolution (LTE) Radio Access Network (RAN) L18

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:

Delivery Method
Instructor Led Training (ILT)
Web-based Learning (WBL)

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Auto Provisioning in ENM

LZU1082582 R1A

Description

How does the Auto Provisioning (AP) feature in Ericsson Network Manager (ENM) enable auto-integration of a radio node? The course gives an inside view of the functions of the infrastructure entities and the workflow that should be carried out to achieve zero-touch integration. Demo using commands, files and printouts provide a practical example on the way AP is used.

Learning objectives

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

1	Discuss the Auto-integration process and its key elements, including their roles
1.1	Distinguish between a trusted and an untrusted mobile network
1.2	State the functions and roles of DNS, DHCP, AIWS, SMRS, RA, SeG in the context of auto provisioning
1.3	Follow the auto-integration flow
2	Detail the tasks performed during the integration workflow- Network Provisioning, Node Provisioning, Node Commissioning and Node Integration
2.1	Detail the DNS and DHCP configuration with and without IPsec
2.2	Get an overview of the Ericsson Configuration Tool (ECT) during the creation of the configuration scripts to be used in the integration process
2.3	List the contents of a AP project file
2.4	Describe how hardware binding is done in the ENM during the commissioning of a radio node
2.5	Differentiate between the various node integration options- Zero Touch and LMT integration
3	Describe the files and list the auto-provisioning commands that are used for a radio node integration
3.1	Follow through the procedures and commands during Auto provisioning of a radio node

Target audience

This course is suitable for anyone who is required to be familiar with Auto Provisioning in ENM.

Prerequisites

Successful completion of the following courses:

LTE Configuration with ENM
Baseband Radio Node - Operation and Configuration ENM 18 Operations for Radio Access Networks

Duration and class size

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

Learning situation

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

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Baseband Radio Node - Operation and Configuration

LZU1082512 R2A

Description:

Are you ready to introduce the most powerful baseband into your Radio Access Network? What are the features and functionalities of the new Baseband Radio Node? How will the configuration of transport and radio network managed objects look under the Ericsson Common Information Model? Which are the tools (user interfaces) that could be used to configure a Baseband? How would one handle the Configuration, Performance, Security and Fault management operations in a Baseband Radio Node?
"Baseband Radio Node Operation and Configuration" provides the answers to all the questions above. The course includes theoretical sessions where what need to be configured are described and investigated, followed by practical exercises in which the configurations are made.
The course introduces the Baseband unit [also known as (or associated with) “Baseband Radio Node / MSRBS-V2 / COM / RCS / ECIM / G2 / Dus_gen2], and its features and characteristics. After the course, participants will be familiar with integration procedure, the managed objects that need to be configured according to the Ericsson Common Information Model. The Mul-, S1-, X2-, Iub- and Abis- interfaces (with and without IpSec) including basic radio network configuration for LTE/WCDMA/GSM are defined during the training. The students also get hands-on experience (in the areas of Fault/ Software/ Configuration/ Performance/Security Managements) on a Baseband Radio Node unit deployed in a LTE /eNodeB, WCDMA/NodeB and GSM/BTS (17 software) environment.

Learning objectives:

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

1 Explain RAN Architecture, Ericsson Radio System building blocks and Baseband modules.
1.1 Describe the interfaces in Radio Access Network Architecture.
1.2 List the Building blocks in Ericsson Radio system
1.3 Describe the capabilities of Baseband 5216/5212, Baseband R503, Baseband T605 and the new versions 6620/6630/ 6303/6502/C608 and P614.
1.4 Explain the hardware and software architecture of Baseband.
1.5 Compare the Hardware differences between Baseband, DUS 41 and DUL 20.
1.6 Explain the different possible options of O&M with the Baseband.

2 Describe the Transport Network functionalities and introduce ECIM MOM
2.1 Describe the Mu, S1, X2, Iub and Abis protocol and recognize the Managed objects related to Transport network.
2.2 List the transmission capabilities for Baseband Radio Node and Baseband Radio TNode
2.3 Relate the IP and Ethernet functionalities of Baseband to the RAN Transport Network

2.4 Introduce and Explain in the brief the Ericsson Common Information Model (ECIM)
2.5 Compare the Managed objects related to transport network in baseband with CPP nodes.
2.6 List out the different synchronization options that are supported by the Baseband.
2.7 Explain what IP Security (IPsec) is and how it is supported in RAN
2.8 Recognize Managed Objects related to IPsec implementation and some key attributes that define the working of IPsec

3 Explain the Radio Network in Baseband Radio Node
3.1 Explain the concept of cell and its relation to sector and antenna system in RBS.
3.2 Introduce the new radio products in Ericsson radio system
3.3 Recognize the Managed Objects related to radio network configuration
3.4 Relate the Managed Objects and figure out the changes according to Ericsson Common Information Model (ECIM)
3.5 Edit and implement the files for on-site usage that would create the Radio network (Cells, Cell relations) as applicable in an eNodeB, NodeB or BTS.

4 Describe the Integration, Operation and Management aspects of Baseband and implement them using the O&M tools.
4.1 Explain the possible External Management interfaces and login option to the Baseband
4.2 Describe in brief the Integration process for Baseband eNodeB and NodeB or BTS.
4.3 Explain the configuration files that are used in the integration of a Baseband Radio Node
4.4 Compare the different Configuration Options available for Baseband
4.5 Demonstrate with exercises the Configuration Management, Performance Management and Fault Management in the Baseband
4.6 Explain the Security Management process in the Baseband
4.7 Describe the process to collect the ESI/DCG logs and perform basic troubleshooting

Target audience:

This course is suitable for anyone who is required to configure/operate/maintain a Baseband Radio Node.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview, LZU1087020
LTE L16 Configuration, LZU1082168-Optional
or
WCDMA System Overview, LZU1085418
WCDMA EVO-C 8200 Configuration, LZU1088931-Optional
or
GSM System Survey, LZU108852
Ericsson Radio System Overview, LZU1089991 – Recommended

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Duration and class size:

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

Learning situation:

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

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Baseband Radio Node - Troubleshooting

LZU1082767 R1A

Description:

With the introduction of the new Ericsson Radio System, what are the main challenges while operating and handling Baseband Radio Node unit? What are the common faults, how are they detected and solved? How does Ericsson local/field support enable and collects logs from a Baseband unit?

The objective of this course is to describe the main troubleshooting processes for Baseband Radio Node unit.

During the course, the participants will be able to detect faults, analyze and collect different types of logs, perform alarm handling procedures, describe and use troubleshooting tools, initiate performance recordings, verify transport network connectivity, and execute emergency recovery procedure.

This training also offers hands-on experience in an LTE, WCDMA and GSM RAN environment.

Learning objectives:

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

1 Describe and use Baseband troubleshooting tools
1.1 List the areas in the Baseband unit that require troubleshooting knowledge
1.2 Review the Ericsson Common Information Model (ECIM) Managed Object Model (MOM)
1.3 Explain the main tools used to support the Baseband unit such as EMCLI, ECLI
1.4 Describe when to use the RBS related tools in troubleshooting the Baseband unit
1.5 Explain when to use the ENM related tools in troubleshooting the Baseband unit

2 Detail emergency recovery procedure and collect data
2.1 List how to collect detailed node data for customer service requests
2.2 Apply the Data Collection Guide for the Baseband unit using EMCLI, ECLI, EA tools.
2.3 Know the principles of node field recovery
2.4 Be able to perform node recovery actions
2.5 List and explain the functions of the various files that make up a Backup

3 Describe the steps involved in transport and radio network troubleshooting
3.1 Check O&M connectivity on the Mul interface
3.2 Discuss issues related to transport network configuration and actions required
3.3 Verify the Network Synchronization status
3.4 Discuss issues related to radio network configurations and actions required

3.5 Identify the Managed Objects that hold parameters related to mobility

4 Discuss and perform system Management level troubleshooting concepts
4.1 Explain troubleshooting CM, SM, PM, FM issues with EMCLI, ECLI, EA tools
4.2 List the related Managed objects for troubleshooting security Management issue
4.3 Expand and act on Alarms
4.4 Relate counter values to RBS's performance

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of Baseband Radio Node Troubleshooting procedures.

Prerequisites:

Successful completion of the following courses:

Ericsson Radio System Overview, LZU1089991
Baseband Radio Node - Operation and Configuration - LZU1082512

Duration and class size:

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

Learning situation:

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

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Ericsson Internet of Things (IoT) Overview - WBL

LZU1082656 R1A

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 IoT (Internet of Things)
2. Underline the IoT market landscape
3. Explain the challenges involved with IoT
4. Present Ericsson Massive IoT Solutions
5. Analyze the IoT functional stack
6. Describe Ericsson EPC solution for IoT
7. Describe the DCP (Device Connectivity Platform), AppIoT (Application Platform for IoT) and IoT Accelerator
8. Highlight some use cases

Target audience

This course is suitable for anyone who is required to be familiar with Ericsson Internet of Things (IoT).

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 hour and the maximum number of participants per session is 1.

Learning situation

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

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Ericsson Radio System Overview

LZU1089991 R5A

Description:

Do you need to understand how Ericsson Radio System is a solution to the changing radio access needs towards the 5G? What are new products that have been introduced in Ericsson Radio System which will coexist with the existing products in Ericsson's radio access networks? The "Ericsson Radio System Overview" course provides the participants with a comprehensive overview of Ericsson's new packaging of the radio access network products in Ericsson Radio System.

Learning objectives:

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

1 Discuss the evolution of the radio access network
1.1 Identify a typical existing site and its challenges to meet the future demands
1.2 List the requirements for the future networks with roadmap
1.3 Explain the multi-standard, multi-band and multi-layer solutions with Ericsson Radio System
1.4 Discuss how a typical Ericsson Radio System based site could look like

2 List the features of the baseband products
2.1 Identify and list the primary features of new Basebands
2.2 List the existing Digital Units and explain their primary features
2.3 Explain with use cases different baseband deployment configurations

3 Describe the different Fronthaul products suited for macro and small cell deployments
3.1 Describe what Fronthaul is
3.2 Explain the characteristics and products under DWDM and CWDM
3.3 List and understand the specifications of Fronthaul 6392

4 Identify different Radio Products and their primary features
4.1 List the characteristics of the latest radio units including the 5G/NR radios that are available in Ericsson Radio System
4.2 Describe the characteristics and the usage of the new Remote Radio Units (RRUs)
4.3 Explain the characteristics and advantages of the Antenna Integrated Radio (AIR) products
4.4 List the benefits of the new installation options and features Introduced

5 Describe the wide range of Backhaul products for Outdoor and Indoor Scenarios
5.1 List the various Aggregation Units offered in Ericsson Radio System, and explain their usage
5.2 List the characteristics of the new products in Router 6000 Series

5.3 Match the new products in the Mini Link Portfolio to the Indoor and Outdoor usage

6 List the new enclosure and power options available under Ericsson Radio System Hardware
6.1 Describe the different Enclosure options and its Outdoor/indoor functionality
6.2 Identify Power System Solutions for Macro, Main remote and Hybrid configurations
6.3 Explain small cell implementation with the various Indoor Power Products
6.4 Discuss the Installation options and Configuration for the Power Products

7 Expand the products under Small cell portfolio and describe their features and benefits
7.1 List the characteristics of New Micro RBS, Pico RBS, Radio Dot System (RDS) and their configuration options
7.2 List the characteristics and usage of the various Wi-Fi Access Points (AP) products

8 List and discuss the available Energy solution options under the Ericsson Radio System portfolio
8.1 Describe the various energy saving solutions implemented for a site deployment
8.2 Explain how Ericsson radio system products helps in reducing Total Cost of Ownership (TCO) and power consumption for the operator
8.3 Explain, with examples, how one can build energy-optimized networks

Target audience:

This course is suitable for anyone who is required to be familiar with Ericsson Radio System.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview, LZU1087020 (ILT)
or
LTE/SAE Overview, LZU1087318 (WBL)

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 or remote delivery environment.

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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 interconnection 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

Target audience:

This course is suitable for anyone who is required to be familiar with Internet of Things (IoT) concept, and an overview of the technical implementation.

Prerequisites:

Successful completion of the following courses:

The instructor must have a solid knowledge related to Internet of Things, Information Technology (IT), IP networks and a good telecommunications background as well as End to End Network knowledge with Evolved Packet System (EPS).

Duration and class size:

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

Learning situation:

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

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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

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of Cat-M implementation in an LTE network.

Prerequisites:

Successful completion of the following courses:

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 per session is 16.

Learning situation:

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

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LTE (Digital Unit - Based) Configuration

LZU1082381 R1A

Description:

Are you now ready to configure your own LTE, Digital Unit Based (DUL/DUS) 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 L17 Configuration describes how an RBS 6000 is configured in the L17 version of LTE RAN. The course includes both theoretical sessions describing what need to be configured, and practical exercises 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, explain 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.

NOTE: THIS COURSE FOCUSES ON DU-BASED ENODE B IMPLEMENTATION.

Learning objectives:

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

1 Explain LTE L17 interfaces and the integration of both RBS 6000 and Baseband
1.1 Describe the interfaces S1, X2 and Mul to an eNodeB in LTE L17
1.2 Identify the main differences between various RBS 6000 products and different units
1.3 Summarize the integration process of an eNodeB 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 Network in RBS 6000
2.1 Relate the IP and Ethernet functionality to the L17 RAN Transport Network
2.2 Describe the hardware used to support IP/Ethernet transmission in RBS 6000
2.3 List the various ways Network Synchronization reference may be realized for a RBS 6000
2.4 Recognize the Managed Objects related to the Mul-, S1- and X2-interfaces implementation, and how some key attributes implement the transport network functionalities
2.5 Edit BSIM templates in the OSS-RC to be used during configuration

2.6 Perform the on-site integration of an RBS 6000 manually with the Site Installation file, the Site Basic file and the Site External file
2.7 Configure the Transport Network and Radio Network using both manual and auto integration procedures

3 Configure the Radio Network in RBS 6000
3.1 Explain the concept of cell and its relation to sector and antennae system in RBS 6000
3.2 Recognize the Managed Objects related to radio network configuration
3.3 Identify some basic parameters related to cell and cell relations
3.4 Identify, and, if necessary, change QoS related parameters in RBS 6000

4 Explain the impact of IpSec during the Transport Network configuration in RBS 6000
4.1 Explain what IP Security (IpSec) is and how it is supported in the LTE RAN
4.2 Recognize Managed Objects related to IpSec implementation and the some key attributes that define the working of IpSec
4.3 State how the configuration files would be affected with IpSec in the LTE RAN
4.4 Identify how the configuration procedure would be affected by having IpSec in the RBS 6000

Target audience:

This course is suitable for anyone who is required to configure DU-based eNodeBs in LTE RAN from the OSS-RC.

Prerequisites:

Successful completion of the following courses:

LTE Operation with ENM, LZU1082393
LTE L17 Air Interface, LZU1082386 (Optional)

Duration and class size:

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

Learning situation:

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

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LTE (Digital Unit - Based) Operation

LZU1082514 R1A

Description:

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 Note the primary functions of the nodes that build up LTE/SAE

1.2 Describe on an overview level the O&M infrastructure

1.3 Explain the Operation and Maintenance architecture of an RBS 6000 and where to find documentation about the Managed Object Model

2 Perform hardware and software Management in LTE RAN

2.1 Explain the hardware building practice of RBS 6000 (MPE, DU, RU) and different ways O&M connectivity can be established to the node

2.2 Export and handle hardware and software resources in an RBS 6000 via OSS-RC and EM

2.3 Recognize the file system in an RBS 6000

2.4 Describe the key Configuration Version concepts

2.5 Work with Configuration Versions and file system using OSS-RC, EM, CLI and AMOS

2.6 List the software upgrade procedure for a batch of RBS 6000 nodes

3 Perform fault management in LTE RAN

3.1 Explain the fault management model

3.2 Solve some common alarms by following Procedural Information, using OSS-RC (Alarm List Viewer and Alarm Status Matrix), AMOS and EM in the process

3.3 Differentiate between the functions of the Command Line Interface (CLI) and Node Command Line Interface (NCLI)

4 Perform performance management on the LTE RAN

4.1 List the performance observables in the LTE RAN, and explain how they are related to Key Performance Indicators

4.2 Explain the E-UTRAN performance management solution

4.3 Identify the various performance statistics/recordings generated in the LTE RAN (Statistics, Cell Tracing, User Equipment Tracing)

4.4 Create a new Subscription Profile in the OSS-RC
4.5 Initiate a UE Trace using the OSS-RC
4.6 Explain what streaming events are and collect these events in OSS-RC
4.7 Perform Key Performance Indicators checks using AMOS

5 Perform basic RBS 6000 configuration procedures using OSS-RC and Element Manager
5.1 Describe the main steps in RBS 6000 integration
5.2 Note the different tools and procedures that could be used for configuration
5.3 Perform configuration changes in an existing eNodeB using Element Manager and/or OSS-RC and/or AMOS

Target audience:

This course is suitable for anyone who is required to operate DU-based eNodeBs in LTE RAN using OSS-RC.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview LZU1087020
RBS 6000 Overview LZU1087503
Or
LTE/SAE Overview LZU1087318 (WBL)

Duration and class size:

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

Learning situation:

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

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LTE (Digital Unit - Based) Troubleshooting with AMOS

LZU1082382 R1A

Description:

While configuring and operating an L17 based LTE RAN network, what are the common faults, how are they detected and solved in a RBS 6000 node? How does Ericsson local/field support enable and collect logs from a RBS 6000 node?
LTE L17 (Digital Unit - Based) Troubleshooting with AMOS explains how a fault is detected, the different types of logs in a RBS 6000 and how logs are collected to be appended to Customer Service Requests (CSRs). Alarm handling procedures and tools are covered with main focus on AMOS, together with the procedure for initiating performance recordings and statistics using OSS-RC 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 focusing on AMOS
1.1 List and use tools available at the RBS site which are available for troubleshooting the RBS
1.2 List tools that may be 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 Describe 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 Browse 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 RBS 6000 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

4 Discuss and perform transport network troubleshooting
4.1 Describe LTE Access Transport Network
4.2 Differentiate DUL and DUS Hardware and Managed Objects
4.3 Explain the Managed Objects and its main parameters related to transport network
4.4 Execute commands to check transport connectivity

Target audience:

This course is suitable for anyone who is required to maintain and troubleshoot DU-based eNodeBs in LTE RAN.

Prerequisites:

Successful completion of the following courses:

LTE L17 Air Interface LZU1082386
LTE (Digital Unit - Based) Configuration LZU1082381
LTE L17 Protocols and Procedures LZU1082390

Duration and class size:

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

Learning situation:

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

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LTE Configuration with ENM

LZU1082698 R1A

Description:

The objective of this course is to configure the LTE RAN eNodeBs, using configuration tools and processes available through the Ericsson Network Manager (ENM). Participants will understand the Managed Objects that must be defined in the eNodeB that set up the equipment, the transport and the cellular networks.

Learning objectives:

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

1 Present Ericsson Network Manager Configuration Tools
1.1 List all configuration tools available for LTE RAN
1.2 Describe each software and point out its features
1.3 Locate ENM CPI information for LTE RAN tools

2 Detail LTE RAN Managed Objects structure as applicable in a Baseband based eNodeB
2.1 Detail ECIM Managed Object Model for eNodeB
2.2 Describe Equipment Managed Object Model for eNodeB
2.3 Identify Transport Managed Object Model for eNodeB
2.4 Understand Radio Network ECIM structure for eNodeB

3 Configure LTE eNodeB using tools and processes available through Ericsson Network Manager
3.1 Use the "Add Node" tools and include a new LTE site
3.2 Describe all tools and procedures for LTE RAN integration
3.3 Use the main ENM tools to print the necessary parameters for eNodeB

Target audience:

This course is suitable for anyone who is required to configure LTE RANs eNodeBs using the ENM.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE Operation with ENM, LZU1082393

Duration and class size:

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

Learning situation:

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

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LTE L17 2017 Delta

LZU1082580 R1A

Description:

How has the Ericsson LTE RAN been improved with the L17.Q1, Q2, Q3 and Q4 software releases? What new features have been introduced? How have the existing features been enhanced? This LTE L17 2017 Delta course explains the new and enhanced features in the L17.Q1, Q2, Q3 and Q4 software releases.

Learning objectives:

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

1 Give an overview of the LTE L17 software releases in 2017
1.1 Describe the challenges facing Mobile Operators in 2017
1.2 Explain the Base and Value Packages that make up the Ericsson Software Model
1.3 Describe LTE Base Package enhancements in 2017

2 Explain the new and enhanced LTE Value Packages in 2017
2.1 Describe the new 'RAN Slicing' Value Package
2.2 Describe the LTE RAN Value Packages that have been enhanced in 2017

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of the changes brought by LTE L17 software.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview, LZU1087020
LTE L17 Air Interface, LZU1082386 or earlier
LTE L17 Radio Network Functionality, LZU1082392 or earlier
LTE L17 Advanced Radio Network Features , LZU1082385 or earlier

Duration and class size:

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

Learning situation:

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

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LTE L18 Access Transport Network Dimensioning

LZU1082702 R1A

Description:

How is the Ericsson LTE 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 are both Ericsson RBS 6000 Hardware and Ericsson Baseband Hardware dimensioned for the LTE transport interfaces? With the help of the LTE 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 both the RBS 6000 / Baseband -based node hardware and transport interfaces are dimensioned for LTE. This 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 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 the LTE Transport Network Overhead used in dimensioning calculations
3.5 Explain how IP and Ethernet Quality of Service (QoS) is implemented in LTE

4 Perform LTE link dimensioning for FDD and TDD Networks
4.1 Describe the different LTE link dimensioning approaches
4.2 Perform last mile and mobile backhaul dimensioning

5 Perform eNodeB hardware and transport interfaces dimensioning for LTE
5.1 Identify the RBS 6000 hardware for LTE
5.2 Identify the Baseband 52 and RBS 6000 hardware for LTE
5.3 Explain the LTE Synchronization mechanism

5.4 Dimension the Digital Unit based node hardware and transport interfaces for LTE
5.5 Dimension of the Baseband node hardware and transport interfaces for LTE

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of transport network dimensioning procedure.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview
Ericsson Radio System Overview
LTE L18 Radio Network Design (optional)

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 technical environment.

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LTE L18 Advanced Radio Network Features

LZU1082694 R1A

Description:

Do you want to have a full and detailed understanding of the Ericsson E-UTRAN advanced features that improve the performance of the LTE RAN? If so then this course is for you! This course describes the advanced Air Interface, Multiple Antenna, Capacity Management, Scheduling, Mobility and Load Balancing features and how they improve network performance. This course will definitely boost your competence and understanding of the Advanced Ericsson E-UTRAN solution.

Learning objectives:

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

1 Explain the features that are available in the Ericsson LTE RAN
1.1 Explain the Ericsson LTE Feature Packages
1.2 Use CPI documentation to locate basic and optional features

2 Describe the advanced Air Interface optional features
2.1 Explain the advanced features related to modulation
2.2 Describe the operation of the Ericsson Lean Carrier optional feature
2.3 Describe the features that support Carrier Aggregation
2.4 4CC and 5CC Carrier Aggregation extension
2.5 Explain the Interference Rejection Combining optional feature
2.6 Describe the features that improve PUCCH and PUSCH performance
2.7 Describe the features that improve PDCCH and PHICH performance
2.8 Explain the Uplink Interference Reporting optional feature

3 Describe the advanced Multiple Antenna optional features
3.1 Describe the MIMO features supported by the Ericsson LTE RAN.
3.2 Massive MIMO for TDD introduced as 5G plug-in
3.3 Explain the Combined Cell optional feature
3.4 Describe Uplink and Downlink Coordinated Multi-Point features

4 Describe the advanced Capacity Management and Scheduling features
4.1 Explain the operation of the advanced Admission Control features
4.2 Describe the features that improve the scheduling in the LTE RAN
4.3 Describe the Ericsson Prescheduling optional feature
4.4 Explain the Downlink and Uplink Frequency-Selective Scheduling algorithms
4.5 Flexible Channel Bandwidth Overview

5 Explain advanced Mobility and Load Balancing optional features
5.1 Describe the Service and Subscriber Triggered Mobility features

5.2 Explain the features that improve handover performance
5.3 Describe the Mobility Control at Poor Coverage feature
5.4 Explain the Load Balancing optional features
5.5 Explain Virtual sectors for TDD

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of advanced radio features in LTE.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview LZU1087020
LTE L18 Air Interface LZU1082699
LTE L18 Protocols and Procedures LZU1082693
LTE L18 Radio Network Functionality LZU1082701

Duration and class size:

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

Learning situation:

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

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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
2.7 Detail the reference symbols in DL
2.8 Detail the DL control signaling 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:

This course is suitable for anyone who is required to have detailed knowledge of LTE radio interface.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following course:
LTE/SAE System Overview LZU1087020

Duration and class size:

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

Learning situation:

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

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LTE L18 Carrier Aggregation - Design & Optimization

LZU1082503 R1A

Description:

Why is everyone talking about Carrier Aggregation (CA)? What advantages does a CA-capable LTE-advanced network have over a traditional LTE RAN?
In the training "Carrier Aggregation – Design & Optimization", the participants go through the CA features in depth, followed by performance management and design aspects. This knowledge would definitely help in introducing or/and evaluating CA in Ericsson's LTE-Advanced radio network.

Learning objectives:

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

1 Describe the advantages of Carrier Aggregation
1.1 Explain the need for CA
1.2 Detail the bandwidth supported in component carriers
1.3 Follow the 3GPP Evolution in CA
1.4 Relate CA and features to the Ericsson software releases

2 Describe the Ericsson CA Feature Packages
2.1 Explain the CA feature in detail
2.2 Describe the additional 3CC/4CC/5CC features
2.3 List and explain the features that support S-cell selection
2.4 Explain mobility for CA capable UE
2.5 Describe the CA load balancing feature

3 Explain the design considerations while introducing CA
3.1 Understand the consequences on existing LTE RAN
3.2 Detail the Subscriber Capacity dimensioning considerations
3.3 Explain the various CA threshold parameters
3.4 Address the CA configuration/de-configuration concerns
3.5 Consider Control Channel dimensioning related to CA

4 Describe Performance Management for CA capable UE
4.1 Understand how throughput is calculated
4.2 List critical counters related to downlink and uplink CA measurements
4.3 Measure the penetration of CA capable handsets
4.4 Understand the reasons for CA De-configuration
4.5 Look at techniques to improve CA utilization

5 Explain the hardware capabilities of Ericsson portfolio
5.1 Describe the hardware capabilities to enhance CA coordination

5.2 List the small cell products and relate their capabilities for CA
5.3 Understand the benefit of LTE Assisted Access for CA
5.4 Explain the Elastic RAN concept and its relation to CA

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of the Carrier Aggregation functionality and the related design and performance considerations.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview
LTE L17/L18 Air Interface
LTE L17/L18 Protocols and Procedures
LTE L17/L18 Radio Network Functionality
LTE L17/L18 Performance Management & Optimization

Duration and class size:

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

Learning situation:

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

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LTE L18 Initial Tuning

LZU1082696 R1A

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 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
2.5 Explain the SON feature MDT (Minimizing Drive Tests)

3 Perform CELL tuning
3.1 Describe the different interference scenarios in a LTE network
3.2 Describe the inter-frequency 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:

This course is suitable for anyone who is required to have detailed knowledge of tuning procedures for an initial LTE radio network deployment.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview, LZU1087020
LTE L18 Air Interface
LTE L18 Protocols and Procedures
LTE L18 Radio Network Functionality
LTE L18 Advanced Radio Networks Features

Duration and class size:

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

Learning situation:

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

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LTE L18 Performance Management and Optimization

LZU1082703 R1A

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 and ENM? This 'LTE L18 Performance Management and Optimization' course will allow students to become familiar with using CPP and/or Baseband based 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 and ENM to collect counters from the eNodeB, setup and decode LTE Cell and UE Trace. They will also use the Advanced MO Scripting (AMOS) tool to display counter values and KPIs on the eNodeB

Learning objectives:

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

1 Explain the E-UTRAN Performance Management solution
1.1 Explain the E-UTRAN Optimization Solution
1.2 Describe how eNodeB counters are collected and stored
1.3 Describe the eNodeB counter types and structures
1.4 Explain briefly Quality of Service concepts in EPS

2 Measure LTE Accessibility performance
2.1 Describe the Random Access procedure
2.2 Describe the E-RAB setup procedure and associated counters
2.3 Use eNodeB counters to create E-RAB Accessibility KPIs
2.4 Explain the eNodeB parameters and Features 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 Radio Connection Supervision
3.4 Explain the eNodeB parameters and Features 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 and Features 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 and Features 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 and Features that influence Cell Availability and System Utilization

7 Explain what is collected by LTE Cell and UE Trace
7.1 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 Open an AMOS session
9.1 Use AMOS to perform basic Performance Management operation in the CPP and/or Baseband based eNodeB

10 Explain ENM Statistics, Cell and UE Trace Handling
10.1 Initiate a new subscription profile in PMIC
10.2 Describe and use the KPI Management application in ENM
10.3 Explain how the Network Health Monitor widgets may be monitored to check the some KPIs

11 Open an ENM CLI session
11.1 Describe the cmedit configuration related commands
11.2 Launch the ENM CLI and access the cmedit documentation
11.3 Use cmedit command set to view and edit node configuration data

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Target audience:

This course is suitable for anyone who is required to understand the KPIs and work with performance management in a LTE RAN.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE L18 Air Interface - LZU1082699
LTE L18 Protocols and Procedures - LZU1082693
LTE L18 Radio Network Functionality - LZU1082701
LTE L18 Advanced Radio Network Features - LZU1082694
LTE L18 Troubleshooting with AMOS - LZU1082696

Duration and class size:

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

Learning situation:

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

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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 intra-LTE, inter-LTE, 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

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:

This course is suitable for anyone who is required to have detailed knowledge of LTE signaling procedures.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following course:
LTE L18 Air Interface, LZU1082699

Duration and class size:

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

Learning situation:

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

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LTE L18 Radio Network Design

LZU1082697 R1A

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 300 Mbps? What types of traffic are carried by the LTE Network? What are the demands of the subscribers? How is the coverage and capacity of an LTE cell calculated? How is the LTE Radio Network implemented with Ericsson hardware?

This LTE L18 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.

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 Describe the different types of traffic carried by LTE networks.
2.1 Explain 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 demands of different applications.

3 Explain coverage in modern mobile radio systems.
3.1 Outline application demands.
3.2 Explain coverage versus quality.
3.3 Explain link budgets in LTE.

4 Perform calculations on the radio interface capacity.
4.1 Explain how the LTE downlink and uplink data rates are achieved and calculated.
4.2 List the LTE UE category capabilities.
4.3 Explain radio wave propagation and typical channel models.

5 Explain the Ericsson LTE dimensioning process.
5.1 Perform uplink and downlink coverage and capacity calculations for LTE.
5.2 Recommend sites for LTE deployment to meet coverage and capacity requirements set by the customer.

6 Explain the types of other dimensioning needed after capacity and coverage has been defined.
6.1 Perform Control Channel dimensioning.
6.2 Perform Tracking Area planning.
6.3 Perform Paging Capacity calculations.
6.4 Apply subscriber and traffic growth scenarios and perform dimensioning exercise.

7 Explain the RAN Hardware associated with eNodeB cell site
7.1 List the Ericsson products in the Ericsson Radio System family
7.2 Explain the hardware structure and capabilities of some of the eNodeB products

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of radio network design.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE L18 Air Interface, LZU1082699
LTE L18 Protocols and Procedures, LZU1082693
LTE L18 Radio Network Functionality, LZU1082701
LTE L18 Advanced Radio Network Features, LZU1082694

Duration and class size:

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

Learning situation:

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

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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 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:

This course is suitable for anyone who is required to have detailed knowledge of LTE radio network functionalities.

Prerequisites:

Successful completion of the following courses:

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 per session is 16.

Learning situation:

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

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LTE Mobility and Throughput - KPI Analysis and Optimization Workshop

LZU1082504 R2A

Description:

Mobility and Throughput are two of the most important performance indicators in LTE RAN. What constitutes the Mobility and Integrity Key Performance Indicators? What are the parameters that influence them? How can one improve these two very important KPIs in the network?
'LTE Mobility and Throughput - KPI Analysis & Optimization' workshop will allow students to analyze the eNodeB Mobility and Integrity KPIs, identify counters that create KPI formulae and relate the parameters/features that affect these network KPIs. Participants also go through the optimization steps. Case studies related to Handover Success Rate, CS Fallback, Throughput and Latency performances are examined.

Learning objectives:

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

1 Describe LTE Mobility performance and related parameters
1.1 List and explain parameters related to Idle mode mobility
1.2 Describe different LTE mobility KPIs & counters for X2HO, S1HO, IFHO, IRATHO
1.3 Validate Mobility related parameter affecting different KPIs
1.4 Follow and evaluate the steps for optimization of these KPIs
1.5 Analyze features and the related parameters which improve LTE Mobility KPIs

2 Analyze issues related to mobility KPIs
2.1 Explain cases and investigation for different HOSR degradation and improvements
2.2 Analyze some cases for CSFB degradation and solutions
2.3 Investigate ANR related major issues and solutions
2.4 Discuss different offline data and cases, for degradation analysis

3 Explain LTE Integrity performance and related parameters
3.1 Describe different LTE integrity KPIs & counters related to Throughput, Latency
3.2 Explain associated parameters related to different Integrity KPIs
3.3 Relate QoS and Scheduling profiles to integrity optimization
3.4 Analyze steps to effectively troubleshoot throughput issues
3.5 Explore related features and associated parameters for throughput enhancement
3.6 Measure VoLTE effect on throughput and data services KPIs

4 Identify issues and discuss improvements related to Integrity KPI
4.1 Follow analysis steps for DL/UL Throughput investigation & list the essential checks
4.2 Describe DL & UL throughput optimization strategy

4.3 Discuss different cases of throughput and latency degradation
4.4 Analyze cases related to low throughput and high latency, and explore probable solutions

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of performance knowledge (for mobility and throughput KPIs) and suggest corrective changes.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview
LTE L18 Protocols and Procedures
LTE L18 Radio Network Functionality
LTE L18 Performance Management and Optimization

Duration and class size:

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

Learning situation:

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

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LTE Operation with ENM

LZU1082393 R2A

Description:

The "LTE Operation with ENM" course covers common operational tasks in the LTE radio network that NOC and OMC personnel come across in their daily work, using Ericsson Network Manager (ENM) as the operational tool. 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. ENM 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 Note the primary functions of the nodes that build up LTE/SAE

1.2 Describe, on an overview level, the O&M infrastructure and the functions of each component

1.3 Explain the Operation and Maintenance architecture of an eNodeB (Digital Unit based and Baseband-based) and locate the proper documentation to work with the operational procedures and descriptions

1.4 List the various ENM applications related to the LTE RAN management

2 Perform hardware and software management in LTE RAN

2.1 List and explain the functions of various hardware units that could be present at an eNodeB site- Digital Unit –based or/and Baseband –based

2.2 Describe the different ways O&M connectivity can be established to the various types of eNodeBs

2.3 Perform inventory related operations on the various types of eNodeBs using the SHM

2.4 Explain and perform configuration backup management operations towards an eNodeB using ENM's SHM and Topology Manager, EM, COLI, ECLI and AMOS

2.5 List the software upgrade procedure and License administration in LTE RAN and explain how ENM/SHM may be used to carry out the upgrade procedure

2.6 Discuss the various ways hardware and software inventory may be created using the ENM and the node management interfaces

3 Perform fault management in LTE RAN

3.1 Explain the fault management model

3.2 Solve some common alarms by following Procedural Information, using network management and element management tools/interfaces

3.3 Differentiate between the functions of the Command Line Interface (COLI) and Node Command Line Interface (NCLI), ECLI in the process of fault management

4 Perform performance management on the LTE RAN
4.1 List the performance observables in the LTE RAN, and explain how they are related to Key Performance Indicators
4.2 Explain the E-UTRAN performance management solution
4.3 Identify the various performance statistics/recordings generated in the LTE RAN (Statistics, Cell Tracing, User Equipment Tracing)
4.4 Create new Subscription Profile and verify the collection of statistics using the ENM and COLI/ECLI
4.5 Initiate a UE Trace
4.6 Explain what streaming events are and collect these events

5 Perform basic configuration changes using ENM and EM/ECLI and AMOS
5.1 Describe the main steps in an eNodeB integration
5.2 Note the different tools and procedures that could be used for configuration
5.3 Perform configuration changes in an existing eNodeB using Element Manager, ECLI, EMCLI, ENM and AMOS

Target audience:

This course is suitable for anyone who is required be operate LTE eNodeBs from the ENM.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview
Ericsson Radio System Overview
ENM Technical Foundation (recommended)

Duration and class size:

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

Learning situation:

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

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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.

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LTE RAN 2018 Delta

LZU1082664 R1A

Description:

How has the Ericsson LTE RAN been improved with the L18.Q1, Q2, Q3 and Q4 software releases? What new features have been introduced? How have the existing features been enhanced? This LTE RAN 2018 Delta course explains the new and enhanced features in the L18.Q1, Q2, Q3 and Q4 software releases.

Learning objectives:

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

1 Give an overview of the LTE RAN software releases in 2018
1.1 Explain the LTE RAN Base and Value Packages
1.2 Explain the LTE RAN Base Package Enhancements L18.Q1, Q2, Q3 and Q4

2 Explain the LTE RAN Value Package Enhancements in 2018
2.1 Describe the LTE RAN Value Packages that have been enhanced in L18.Q1, Q2, Q3 and Q4

Target audience:

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

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview, LZU1087020
LTE L17 Air Interface, LZU1082386 or earlier
LTE L17 Radio Network Functionality, LZU108392 or earlier
LTE L17 Advanced Radio Network Functionality, LZU1082385 or earlier

Duration and class size:

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

Learning situation:

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

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LTE RAN L18.Q1 Delta

LZU1082665 R1A

Description

How has the Ericsson LTE RAN been improved with the L18.Q1 release? What new features have been introduced and how have the existing features been enhanced? This Web-based Learning Delta course explains the new features and enhanced features included in the L18.Q1 release.

Learning objectives

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

1. Explain the contents of the L18.Q1 release.
2. Describe the enhancements to the ‘LTE Base’ Package.
3. Describe the enhancements to the ‘Carrier Aggregation' Value Package.
4. Describe the enhancements to the ‘Combined Cell’ Value Package.
5. Describe the enhancements to the ‘Self-Organizing Networks’ Value Package.
6. Describe the enhancements to the ‘Energy Efficiency’ Value Package.

Target audience

This course is suitable for anyone who is required to be familiar with the new features and enhanced features of Ericsson LTE RAN included in the L18.Q1 release.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview - LZU1087020
LTE L17 Air Interface - LZU1082386 or earlier
LTE L17 Radio Network Functionality - LZU1082392 or earlier
LTE L17 Advanced Radio Network Functionality - LZU1082385 or earlier

Duration and class size

The length of the course is 50 minutes and the maximum number of participants per session is 1.

Learning situation

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

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LTE RAN L18.Q2 Delta

LZU1082666 R1A

Description:

How has the Ericsson LTE RAN been improved with the L18.Q2 release? What new features have been introduced and how have the existing features been enhanced? This Web-based Learning Delta course explains the new features and enhanced features included in the L18.Q2 release.

Learning objectives:

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

1 Explain the contents of the L18.Q2 release.

2 Describe the enhancements to the 'LTE Base' Package.

3 Describe the enhancements to the 'VoLTE' Value Package.

4 Describe the enhancements to the 'Advanced Downlink MIMO' Value Package.

5 Describe the enhancements to the 'Elastic RAN' Value Package.

6 Describe the enhancements to the 'CoMP' Value Package.

7 Describe the enhancements to the 'Ericsson Lean Carrier' Value Package.

8 Describe the enhancements to the 'IPSec' Value Package.

9 Describe the enhancements to the 'Time and Phase Synchronization' Value Package.

Target audience:

This course is suitable for anyone who is required to be familiar with new features and enhanced features of Ericsson LTE RAN included in the L18.Q2 release.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview - LZU1087020
LTE L17 Air Interface - LZU1082386 or earlier
LTE L17 Radio Network Functionality - LZU1082392 or earlier
LTE L17 Advanced Radio Network Functionality - LZU1082385 or earlier

Duration and class size:

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

Learning situation:

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

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LTE RAN L18.Q3 Delta

LZU1082667 R1A

Description

How has the Ericsson LTE RAN been improved with the L18.Q3 release? What new features have been introduced and how have the existing features been enhanced?
This Web-Based Learning Delta course explains the new features and enhanced features included in the L18.Q3 release.

Learning objectives

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

1. Explain the contents of the L18.Q3 release.
2. Describe the enhancements to the ‘LTE Base’ Package.
3. Describe the enhancements to the ‘Spectral Efficiency’ Value Package.
4. Describe the enhancements to the ‘Carrier Aggregation’ Value Package.
5. Describe the enhancements to the ‘Advanced Carrier Aggregation’ Value Package.
6. Describe the enhancements to the ‘Elastic RAN’ Value Package.
7. Describe the enhancements to the ‘VoLTE Performance’ Value Package.
8. Describe the enhancements to the ‘Self-Organizing Networks’ Value Package.
9. Describe the enhancements to the ‘RAN Slicing’ Value Package.

Target audience

This course is suitable for anyone who is required to be familiar with L18 Q3 features.

Prerequisites

Successful completion of the following courses:

LTE/SAE System Overview - LZU1087020
LTE L17 Air Interface - LZU1082386 or earlier
LTE L17 Radio Network Functionality - LZU1082392 or earlier
LTE L17 Advanced Radio Network Functionality - LZU1082385 or earlier

Duration and class size

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

Learning situation

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

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LTE RAN L18.Q4 Delta

LZU1082668 R1A

Description:

How has the Ericsson LTE RAN been improved with the L18.Q4 release? What new features have been introduced and how have the existing features been enhanced?
This Web Based Learning Delta course explains the new features and enhanced features included in the L18.Q4 release.

Learning objectives:

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

1 Explain the contents of the L18.Q4 release.

2 Describe the enhancements to the ‘LTE Base’ Package.

3 Describe the enhancements to the ‘CoMP’ Value Package.

4 Describe the enhancements to the ‘Carrier Aggregation’ Value Package.

5 Describe the enhancements to the ‘Mission Critical High Load Handling’ Value Package.

6 Describe the enhancements to the ‘Service-Based Mobility’ Value Package.

7 Describe the enhancements to the ‘VoLTE Performance’ Value Package.

Target audience:

This course is suitable for anyone who is required to be familiar with Ericsson LTE RAN L18.Q4 release.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview, LZU1087020
LTE L17 Air Interface, LZU1082386 or earlier
LTE L17 Radio Network Functionality, LZU1082392 or earlier
LTE L17 Advanced Radio Network Functionality, LZU1082385 or earlier

Duration and class size:

The length of the course is 60 minutes and the maximum number of participants per session is 1.

Learning situation:

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

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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 RBS hardware and the operation and maintenance concepts.

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
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:

This course is suitable for anyone who is required to be familiar with LTE and SAE networks.

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 per session is 16.

Learning situation:

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

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Mixed Mode Configuration in RBS

LZU1082324 R1A

Description:

How is mixed mode configured in the baseband and digital units? What conditions should be met for LTE-WCDMA, LTE-GSM and GSM-WCMDA mixed mode implementation? What are the possible hardware, software and synchronization methods that would support the mixed mode implementation?

Mixed Mode Configuration in RBS course will be able to help to determine the solution for the questions mentioned above. This course is a combined theory and practical instructor led course, discussing and applying mixed mode concept, mixed mode possible scenarios, hardware and software configurations and synchronization options on baseband and digital units.

The course focuses on LTE, WCDMA and GSM mixed mode implementation (DU and Baseband). In addition, it also includes management tools, O&M view and Node Group Synchronization configurations. The students would be able to get a hands-on experience to perform mixed mode configuration.

Learning objectives:

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

1 Explain the RAN System Architecture, Mixed Mode Concept in DU and Baseband modules
1.1 Explain the basic GSM, WCDMA and LTE Radio Access Network
1.2 Describe the features and capabilities of the baseband unit and digital units
1.3 Explain the benefits of the mixed mode feature Implementation
1.4 Determine the different RAT mixed mode scenarios
1.5 Detail the hardware requirements and cabling connections for mixed mode implementation

2 Know the synchronization methods supported for baseband and digital Units
2.1 Introduce Node Group Synchronization-Mixed Mode CPRI
2.2 List the Synchronization options supported for Digital Units
2.3 Know the configuration needed in Basebands for the mentioned synchronization options

3 List the configuration steps in Multi-Standard Mixed Mode Baseband and Radio Configurations
3.1 Explain the interworking of mixed mode using baseband and digital units
3.2 Explain the configuration for LTE-WCDMA Mixed Mode implementation on a baseband unit
3.3 Explain the configuration for LTE-GSM Mixed Mode implementation on a baseband unit

3.4 Explain the configuration for GSM-WCDMA Mixed Mode implementation on a baseband unit
3.5 Compare the O&M similarities for the above Mixed mode scenarios

Target audience:

This course is suitable for anyone who is required be able to understand and/or implement mixed mode in a RBS site.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
Ericsson Radio System Overview
Baseband Radio Node – Operation and Configuration OR
LTE (DU-based) Configuration

Duration and class size:

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

Learning situation:

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

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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 Network 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

Target audience:

This course is suitable for anyone who is required to understand and implement NB-IoT on an existing LTE network.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
Internet of Things (IoT) Overview - LZU1082344
LTE RAN L18 Radio Network Functionality (and its pre-requisites)

Duration and class size:

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

Learning situation:

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

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RAN Architecture Evolution to 5G

LZU1082505 R2A

Description:

How would radio access network (RAN) architecture evolve as Ericsson moves from 4G towards 5G? What is Ericsson Cloud RAN?
The course "RAN Architecture Evolution to 5G" highlights the architecture, benefits and requirements of the D-RAN, C-RAN, E-RAN and V-RAN. It emphasizes the benefits of coordination in the 5G RAN with features like Carrier Aggregation and Dual Connectivity.
The course also describes the concepts of network slicing, split architecture and virtualization of the RAN. It further explains the concepts related to onboarding, instantiation, software upgrade, scaling, failover, cloud management, security, mobility and traffic management in the V-RAN. In short, the course keeps you up to date with Ericsson's implementation of the 4G and 5G Virtualized RAN, while also examining the evolution of the network.

Learning objectives:

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

1 Review the Ericsson Cloud RAN
1.1 Explore the 5G targets and technology areas
1.2 Discuss the benefits and requirements of the Distributed RAN (D-RAN), Centralized RAN (C-RAN), Elastic RAN (E-RAN) and Virtualized RAN (V-RAN)
1.3 Explore the ETSI Management and Orchestration Architecture

2 Explore the Distributed RAN and Centralized RAN Architecture
2.1 Determine the baseband coordination in the D-RAN and C-RAN
2.2 Identify the benefits and requirements of the D-RAN and C-RAN
2.3 Examine the Carrier Aggregation and CoMP features
2.4 Describe the Ericsson DUS and Baseband hardware

3 Describe the Elastic RAN Architecture
3.1 Explain the baseband elasticity and coordination in the E-RAN
3.2 Identify the benefits and requirements of the E-RAN
3.3 Describe Carrier Aggregation in E-RAN

4 Review the Virtualized RAN Architecture
4.1 Identify the benefits and enablers of the V-RAN
4.2 Discuss the split architecture and the logical functions of the PPF, RCF and RPF
4.3 Examine the traffic management and mobility in the V-RAN
4.4 Clarify the scaling of V-RAN

5 Describe cloud management and security of the V-RAN
5.1 Examine the Auto Integration and Software Hardware Management of the VNFs

5.2 List the functions of the NFVO, VNFM and the VIM
5.3 Recognize the roles of the ENM and ECM in the V-RAN
5.4 List the various security concerns and solutions in the V-RAN

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of the LTE network evolution towards the 5G RAN.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview
LTE L18 Functionality (and its prerequisites) or equivalent knowledge
5G Overview

Duration and class size:

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

Learning situation:

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

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Security in Ericsson RAN Overview

LZU1082396 R1A

Description:

How secure is your Radio Access Network ? Why do we focus most on security in Ericsson ? What are the different security features in transport network ? How can we implement IPSEC in a current RAN network ? How would one handle user management and certificate enrollment in the RAN products? What security measures are being implemented over the air interface in GSM,WCDMA and LTE?

"Security in Ericsson RAN Overview" provides the answers to all the questions above. The course includes theoretical sessions where what need to be configured are described and investigated, followed by exercises in which the configurations are shown.

The course introduces the Security Concepts deployed in RAN products. After the course the participants will be familiar with the managed objects that need to be configured for IPSEC in Baseband/DUS and describe the requirements and scenarios for OAM security. The concepts of centralized user management and certificate management are also covered .The students also learn about the security handling procedures in the radio domain of the GSM, WCDMA and LTE networks.

Learning objectives:

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

1 Describe the importance of security in Radio Access Networks.
1.1 List the Recent frauds reported in the area of telecom.
1.2 Discuss the security measures that need to be taken in current networks.
1.3 Know the role and responsibility of PSIRT in Ericsson.
1.4 Differentiate the level of security in RAN products.
1.5 Underline the security needs for a RAN network operator.

2 Explain and brief the Security features in transport network.
2.1 Explain what IP Security (IPsec) is and how it is supported in RAN.
2.2 List the different network scenarios and requirements for IPSEC deployment.
2.3 Recognize Managed Objects related to IPsec implementation and some key attributes that define the working of IPsec.
2.4 Compare the Managed Objects related to IPSEC in baseband and CPP based Nodes.
2.5 Describe the importance for OAM security and role of TLS.

3 Describe in detail about centralized user management and Certificate enrollment.
3.1 Explain the basic function of Centralized user management.
3.2 List the centralized user management flow followed in NE Integration.

3.3 Categorize the Access control methods used in LDAP configuration(TBAC/RBAC).
3.4 Describe the steps in creating Proxy accounts and handling COM users.
3.5 Brief in detail the Certificate enrollment process involved in the nodes.
3.6 Know the overview of PKI certificates.

4 Explain the security detail needed for GSM, WCDMA, LTE and 5G.
4.1 Name ciphering and integrity algorithms supported in Ericsson LTE RAN for radio interface.
4.2 Describe the security handling procedure in LTE Radio Access Network.
4.3 Name ciphering and integrity algorithms supported in Ericsson WCDMA RAN for radio interface.
4.4 List the security measures needed for 5G Network.

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of security solution in the transport network.

Prerequisites:

Successful completion of the following courses:

LTE/SAE System Overview
Baseband Radio Node - Operation and Configuration (recommended)

Duration and class size:

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

Learning situation:

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

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Small Cells Deployment on the way to 5G

LZU1082695 R1A

Description:

What are the fundamental considerations one should keep in mind while deploying LTE small cells? The course examines the Ericsson products, features, solutions, radio network design aspects and the operation and maintenance considerations while deploying small cells.
As LTE radio access networks prepare to coexist with the 5G RAN, the course provides that holistic small cell knowledge which becomes increasingly important in evolving radio networks.

Learning objectives:

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

1 Explain the concept of Small cells and integrated networks in RAN
1.1 Describe the need for Small Cells
1.2 Demonstrate how to better utilize small cells
1.3 Identify Ericsson small cell product portfolio and integrated network solution

2 List the features and functions related to small cells.
2.1 Explain the multi-band, multi-standard, multi-layer configurations possible within the small cell portfolio.
2.2 Describe the components of each of the small cell products, describing the various radio configurations (RDS, RBS 6402, micro radios) and deployment options.
2.3 Explain key LTE features available in the small cell portfolio, such as LAA, CBRS, MSMM
2.4 Explain the advantages of an indoor RDS deployment over a traditional DAS deployment.

3 Create a small cell basic radio plan
3.1 Describe the planning and dimensioning process in a small cell radio network deployment
3.2 Describe aspects to consider when deciding where to deploy small cells
3.3 List and explain the primary parameters related to Small Cell deployment

4 Describe the Integration steps and the tools used for Operation and Management of small cells
4.1 Explain integration aspects in small cells
4.2 Compare the integration procedures for various small cell products deployment
4.3 Explain how IPSec tunnel setup is configured and its importance in a unsecured deployment scenario.
4.4 Explain Operation and Management in small cell products including the Pico RBS, the RDS and the micro radios

5 Explain the impact that small cells will have on 5G deployments
5.1 Describe the emerging 5G applications that are driving 5G development indoors and outdoors, including enhanced mobile broadband, critical machine type communications and massive machine type communications
5.2 Discuss the important role that the Radio Dot System will play in indoor 5G applications, in particular, industrial applications

Target audience:

This course is suitable for anyone who is required to understand the small cell implementation in the LTE and eventually NR RAN.

Prerequisites:

Successful completion of the following courses:

LTE L18 Air Interface - LZU1082699 – ILT
LTE L18 Protocols and Procedures - LZU1082693 – ILT
LTE L18 Radio Network Functionality - LZU1082701 - ILT
LTE L18 Advanced Radio Network Features - LZU1082694 - ILT
LTE L18 Radio Network Design - LZU1082697 - ILT
LTE Configuration with ENM - LZU1082698 - ILT
LTE Operation with ENM - LZU1082393 - ILT
ENM 18 Operations for Radio Access Network - LZU1082671 - ILT

Duration and class size:

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

Learning situation:

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

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Voice over LTE e2e Realization and RAN Functionality

LZU1089466 R4A

Description:

Do you want to have a detailed understanding of the Ericsson Voice over LTE (VoLTE) solution with a focus on E-UTRAN?
The course describes the basic VoIP theory, MMTel/IMS/EPC Overview, IMS Signaling in an overview, E-UTRAN functionality and features for VoLTE support and VoIP Radio Network Dimensioning. During the course students will get exposure to VoLTE call traces and statistics from live networks to enhance the learning experience. All this, together with end-user considerations and call procedures will definitely boost your competence and understanding of VoLTE.

Learning objectives:

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

1 Explain the basic idea of VoLTE, including basic VoIP theory
1.1 Present the telecom environment today
1.2 Explain why to implement VoLTE
1.3 Summarize VoLTE against OTT VoIP
1.4 Explains codecs and protocols used for VoLTE

2 Explain, on an overview level, the end-to-end support and QoS for VoIP in EUTRAN, EPC and IMS
2.1 List the main principles in Ericsson E-UTRAN, EPC and IMS for VoIP support
2.2 List the QoS requirements for voice and VoLTE
2.3 Explain the usage of EPS Bearers and APNs for VoLTE
2.4 Explain PCRF, PCEF and MME QoS concept
2.5 Summarize the IMS Signaling
2.6 Explain end-to-end call procedures
2.7 Explain end-to-end QoS assurance and measurements such as Mean Opinion Score (MOS) and total delay

3 Detail the E-UTRAN functionality and features from a VoIP perspective
3.1 Explain the QoS framework
3.2 Describe the protocol handling of VoIP traffic
3.3 Describe how the RAN scheduling features support VoLTE
3.4 Explain the RAN Capacity Management impact on VoLTE
3.5 Describe some of the RAN mobility features that impact VoLTE
3.6 List positioning methods
3.7 Describe VoIP observability

Target audience:

This course is suitable for anyone who is required to have detailed knowledge of the VoLTE implementation with a focus on the LTE RAN.

Prerequisites:

Successful completion of the following courses:

Successful completion of the following courses:
LTE/SAE System Overview - LZU1087020
LTE L18 Air Interface - LZU1082699
LTE L18 Protocols and Procedures - LZU1082693
LTE L18 Radio Network Functionality - LZU1082701
LTE L18 Network Design - LZU1082697

Duration and class size:

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

Learning situation:

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

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