Global Services

Microwave Networks
Training Programs

Catalog of Course Descriptions

ERICSSON

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Ericsson AB
Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Introduction

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

Service delivery is supported using various delivery methods including:

Icon	Delivery Method
	Instructor Led Training (ILT)
	Seminar (SEM)
	Workshop (WS)
	Virtual Classroom Training (VCT)
	Web Based Learning/eLearning (WBL)
	Structured Knowledge Transfer (SKT)
	Delivery Enablers
	Remote Training Lab (RTL)

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Global Services
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Microwave Networks Overview

LZU1086109 R4A

Description

Telecom networks of today employ a variety of technologies and products which at first can be difficult to get an overview of.

This course will help you to understand what a Transmission and Transport network is and how the Ericsson microwave transmission product families can be used to realize such networks in an efficient way. Main features and benefits of the products will be explained.

This course will on its own give an overall understanding of the products and techniques and the knowledge provided by it is a prerequisite for deeper studies in the subject.

Learning objectives

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

1 Give typical applications for Ericsson Transmission and Transport products
2 Describe the main functions of each product family

Target audience

The target audience for this course is: Everyone

Prerequisites

The participants should be familiar with basic telecommunication and have basic data communication knowledge.

Duration and class size

The length of the course is self paced

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Microwave Networks Overview	Self paced

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Microwave Networks System Survey

LZU 1087348 **Error! Unknown document property name.**

Description

Are you interested in getting a basic knowledge about Ericsson Microwave Networks and its main features? This course will provide you with an understanding of the key features and benefits of the products forming the Ericsson Microwave Networks portfolio. After the course you will understand what equipment to use to meet different demands put on the transmission network.

Learning objectives

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

1 Describe basic microwave and digital transmission theory
1.1 Describe PDH, SDH, Ethernet and ATM
1.2 Describe Microwave propagation

2 Describe the system features of the Ericsson microwave products
2.1 List MINI-LINK TN R4 equipment
2.2 List MINI-LINK CN Products
2.3 List MINI-LINK E equipment
2.4 List Marconi LH equipment

3 Describe the system features of ServiceOn Element Manager

4 From given data for the transmission network and with the help from customer documentation configure system hardware for microwave terminals

Target audience

The target audience for this course is: Fundamentals

Prerequisites

The participants should be familiar with basics in telecommunication and transmission.

Duration and class size

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

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Course introduction	0,5 hour
	• Technical introduction to transmission techniques and microwave propagation	1,5 hours
	• Microwave Networks	1 hour
	• MINI-LINK E system features	0,5 hour
	• MINI-LINK TN system features	2,5 hours
2	• MINI-LINK CN Products	0,5 hour
	• Short haul radio parts	0,5 hour
	• Marconi LH system features	1 hour
	• Microwave Networks Management	1 hour
	• System design exercise	2 hours
	• Summing up of the course	0,5 hour

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MINI-LINK TN R3 Operation & Maintenance

LZU 108 6840 R1C

Description

Do you have the right knowledge to work with operation and maintenance in a MINI-LINK TN network? If not, this is the course for you.
With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK TN products and functions. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing operation and maintenance of a MINI-LINK TN network.

Learning objectives

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

1 Have a basic knowledge about transmission fundamentals
2 Define the different parts in a MINI-LINK TN network element
2.1 Name the indoor parts: Radio terminal and Basic Node
2.2 Name the outdoor parts: Radio and antennas
2.3 Name the traffic interfaces
3 Define the functionalities in the MINI-LINK TN concept
3.1 Define traffic routing
3.2 Define protection
3.3 Define Multi/demultiplexer (PDH/SDH)
3.4 Define Network Element synchronization
3.5 Configure synchronization of a MINI-LINK Network
3.6 Configure Ethernet traffic
3.7 Configure ATM aggregation
3.8 Describe Licenses
4 Recognize the MINI-LINK TN accessories
4.1 Name the cables and connectors
4.2 Name the traffic interface panels
4.3 Name the installation accessories
5 Be able to list needed equipment by using defined parameters for a site
6 Have a basic IP knowledge
7 Have a good knowledge about the DCN parts in a MINI-LINK network
7.1 Describe routers
7.2 Name different DCN interfaces: PPP, LAN ports, E1/DS1
7.3 Describe OSPF and Static Routing
8 Recognize the Local Craft Terminal used for operation and maintenance

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9 Configure a MINI-LINK TN network element
9.1 Make initial settings for the Radio terminal and the Basic Node
9.2 Set traffic routing and Ethernet connections
9.3 Set up a ring protection on a E1/DS1 level
9.4 Set the DCN settings and get the DCN up and running
10 Perform maintenance of a MINI-LINK TN network element
10.1 Define alarms and remove them with help of fault finding
10.2 Perform a software upgrade on the MINI-LINK TN network element
10.3 Perform configuration backups
10.4 Exchange Plug-In-Units
10.5 Perform E1 fault finding by using the inbuilt BERT
10.6 Create license requests

Target audience

The target audience for this course is: System Engineers, Field Technicians

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the MINI-LINK TN Installation Course (LZU1086895) or Microwave Networks Overview Course (LZU1086109). Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

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

Learning situation

This course utilizes Instructor Led Training.

The course consists of instructor-led lessons using power point presentations, hardware demonstrations and practical exercises in classroom and in lab environment using live MINI-LINK equipment

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Time schedule

Day	Topics in the course	Estimated time
1	• Introduction	30 min
	• Transmission Overview	30 min
	• MINI-LINK TN Radio Network	1,5 hour
	• MINI-LINK TN System Description	1,5 hour
	• MINI-LINK TN System Configuration Exercise	1,5 hour
2	• MINI-LINK TN Features	1 hour
	• IP Basics & MINI-LINK TN DCN	45 min
	• MINI-LINK TN Management Tools	45 min
	• Local Craft Terminal (LCT) Demo and practical exercises	3 hours
3	• Local Craft Terminal (LCT) Demo and practical exercises	6 hours
4	• MINI-LINK TN Radio Propagation Theory	45 min
	• MINI-LINK TN Advanced Operations Theory	2 hours
	• MINI-LINK TN Maintenance Theory	2 hours
	• Local Craft Terminal (LCT) Demo and practical exercises	45 min
5	• Local Craft Terminal (LCT) Demo and practical exercises	5,5 hours
	• Summing up	30 min

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MINI-LINK TN R4 Operation and Maintenance

LZU 108 7243 R6A

Description

Do you have the right knowledge to work with operation and maintenance in a MINI-LINK TN R4 network? If not, this is the course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK TN R4 products and functions. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing operation and maintenance of a MINI-LINK TN R4 network. This course is updated to meet the MINI-LINK TN release 4.4.

Learning objectives

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

1 Understand Transmission fundamentals.

2 Define the different parts in a MINI-LINK TN network element.
2.1 Name the indoor and outdoor parts.
2.2 Name the traffic interfaces.
2.3 Recognize the MINI-LINK TN accessories.
2.4 Work with the MINI-LINK Craft used for operation and maintenance.

3 Be able to list needed equipment by using defined parameters for a site.

4 Understand the functionalities of the MINI-LINK TN concept.
4.1 Define Traffic Routing.
4.2 Define protection.
4.3 Describe licenses.
4.4 Configure a MINI-LINK TN network element.
4.5 Configure Traffic Routing and ring protection on an E1/DS1 level.
4.6 Describe Adaptive modulation.

5 Understand basic IP and DCN parts of a MINI-LINK TN network.
5.1 Name different DCN interfaces.
5.2 Describe static routing and OSPF.
5.3 Configure the DCN settings and make the DCN up and running.

6 Understand the SDH/SONET functionalities in the MINI-LINK TN
6.1 Configure the SDH/SONET radio terminal.
6.2 Configure the SDH Cross Connect.

7 Understand the ATM Aggregation functionalities in the MINI-LINK TN
7.1 Configure the ATM Aggregation.
7.2 Configure synchronization of a MINI-LINK TN network.

8 Understand the Ethernet functionalities in the MINI-LINK TN

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8.1 Configure Layer 1 & 2 Ethernet traffic over PDH and SDH.
8.2 Configure Native Ethernet Radio links.

9 Perform maintenance of a MINI-LINK TN network element.
9.1 Define alarms and remove them with help of fault finding.
9.2 Perform Configuration backups.
9.3 Perform a Software upgrade.
9.4 Exchange Plug-In Units.
9.5 Perform E1 fault finding by using the inbuilt BERT.
9.6 Create license request.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the MINI-LINK TN Installation Course (LZU1086895 R1B), Microwave Networks Overveiw (LZU 1086109 R2A) or Microwave Networks System Survey (LZU1087348 R2A). Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

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

Learning situation

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

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Time schedule

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Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• Basic PDH Node	2 hours
	• Radio Terminal	1 hour
	• Basic Features	0,5 hour
	• DCN and Management	1 hour
	• Site Configuration Exercise	1 hour
2	• Practical Exercises	6 hours
3	• SDH/SONET Traffic Handling	1 hour
	• SDH/SONET Configuration Exercise	0,5 hour
	• Practical Exercises	1,5 hour
	• ATM Traffic Handling	1 hour
	• ATM Aggregation Configuration Exercise	0,5 hour
	• Practical Exercises	1,5 hour
4	• Ethernet Traffic Handling	2 hours
	• Ethernet Configuration Exercise	1 hour
	• Practical Exercises	3 hours
5	• Radio Propagation Theory	1 hour
	• Maintenance Theory	1 hour
	• Practical Exercises	3.5 hours
	• Summing up	0,5 hour

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MINI-LINK TN Advanced Ethernet Operations

LZU 108 7996 R1A

Description

Are you deploying Ethernet as your main transmission carrier in a MINI-LINK TN R4 network and are you going to use all the functionalities that come with Ethernet? Or do you just want to know the more advanced Ethernet settings you can make in the MINI-LINK TN R4? If so, this is the course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the Ethernet functionalities in the MINI-LINK TN R4 products. During the practical exercises and with guidance from the instructors the attendees will learn how to set up all the different Ethernet possibilities that you have in a MINI-LINK TN R4 network. This course is updated to meet the MINI-LINK TN release 4.4.

Learning objectives

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

1 Understand the different Ethernet functionalities.
1.1 Define User Priority, Network Priority and Traffic Classes.
1.2 Describe Provider bridge switching.
1.3 Describe Policing, Coloring and Aging.
1.4 Describe WRED.
1.5 Describe Strict Priority Queuing and WFQ.
1.6 Describe STP/RSTP/MSTP.

2 Be able to configure all Ethernet functionalities mentioned above.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants have to have participated in the MINI-LINK TN R4 Operation and Maintenance course (LZU 108 7243) (or at least PDH Basic Node Module(LZM112713) and Ethernet Module(LZM112716))

Duration and class size

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

Learning situation

This course is based on Instructor Led Training.

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• Ethernet Networks	1 hour
	• Ethernet Functionalities	3,5 hours
	• Site Configuration Exercise	1 hour
2	• Practical Exercises	5,5 hours
	• Summing up	0,5 hour

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MINI-LINK TN Advanced Troubleshooting

LZU 108 7997 R1A

Description

Are you working with MINI-LINK TN but find it hard to understand the system in detail and to do troubleshooting. If so, this is the course for you.

With the help of the theoretical lessons the attendees will get a deeper knowledge about the MINI-LINK TN R4 products and functions that will help doing troubleshooting. During the practical exercises and with guidance from the instructors the attendees will learn how to think and perform to realize the most common errors there are in a MINI-LINK TN R4 network.

Learning objectives

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

1 Understand how the MINI-LINK TN is built up in a more detailed way.
1.1 Understand when unable to protect occurs.

2 Know how to use the CLI for trouble shooting.

3 Know how to use the alarm and error logs.

4 Know what problems occur from HW and SW incompatibility.

5 Know how to read out the results of the BERT and loops.

6 Know how to find out faulty HW.
6.1 Backplane pin shortcuts.
6.2 Cables and connectors.

7 Know how to read out the RF performance data.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants have to have participated in the MINI-LINK TN Operation & Maintenance course (LZU 1087243). Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

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

Learning situation

This course is based on Instructor Led Training.

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

Time schedule

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate and consists of a mix of theory and practice:

Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• Detailed description of the MINI-LINK TN	2 hours
	• CLI	2 hours
	• Alarm and error logs	1,5 hours
2	• Reading out the results	2 hours
	• HW fault finding	2 hours
	• Interference problems and test	1,5 hours
	• Summing up	0,5 hour

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MINI-LINK TN R4 Operation & Maintenance Delta

LZU 108 7245 R5A

Description

Do you have the right knowledge to work with operation and maintenance in a MINI-LINK TN R4 network? If you already have the competence for MINI-LINK TN R3 but need to know the latest updates, this might be the right course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the O&M delta between MINI-LINK TN release 3 to release 4.4. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing MINI-LINK TN R4 specific operation and maintenance tasks.

Learning objectives

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

1 Define new MINI-LINK TN products
1.1 Indoor parts: AMM's and plug-in units
1.2 Outdoor parts: Radio and antennas
1.3 Traffic interfaces

2 Define the new functionalities in the MINI-LINK TN concept
2.1 Enhanced Ethernet (Ethernet switching, Ethernet over PDH or Packet Link, LAG, WRED, WFQ, Policing, Coloring etc.)
2.2 Enhanced SDH (integrated ADM, EoSDH and enhanced protection scheme)

3 Define new DCN feature in MINI-LINK TN
3.1 Multivendor DCN

4 Handle the new MINI-LINK Craft used for operation and maintenance

5 Configure and Maintain the new MINI-LINK TN R4.4 specific features/functions

Target audience

The target audience for this course is: System Engineer, Field Technician.

Prerequisites

The participants should have participated in the MINI-LINK TN R3 Operation and Maintenance LZU 108 6840.

Duration and class size

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

Learning situation

This course utilizes Instructor Led Training.

The course consists of instructor-led lessons using power point presentations and practical exercises in classroom and in lab environment using live MINI-LINK TN R4 equipment.

Time schedule

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

Day	Topics in the course	Estimated time
1	Introduction	0,5 hour
	Basic Node	1 hour
	Radio Terminal	0,5 hour
	DCN and Management	0,5 hour
	SDH Traffic handling	0,5 hour
	Ethernet Traffic handling	2 hours
	Site Configuration Exercise	1 hour
2	Practical Exercises	5,5 hours
	Summing up	0,5 hour

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Marconi LH R2 Operation and Maintenance

LZU 108 6712 R2B

Description

Will the SDH Long Haul Microwave Radio System Marconi LH be part of your transport and transmission network? Do you have this system in your sphere of responsibility, but you are not able to operate or configure it reliably within the network? Each network element has specific procedures and special features and functions.

With the help of the training documentation provided in this course and the guidance of the instructors, the attendees will learn the most efficient ways of system operation, maintenance, commissioning, configuration and troubleshooting, hence saving time and money.

Learning objectives

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

1 Describe the basic concepts of SDH microwave radio technologies
1.1 Explain the benefits and characteristics of XPIC operation
2 Define the benefits and performance of the Marconi LH equipment
2.1 Clarify the difference to SDH microwave radio systems MDRS155E
2.2 Describe the channel branching network
2.3 Explain the waveguide and dehydrator technology
2.4 Discuss service channels supported
2.5 Understand all line and radio protection concepts
2.6 Explain the delta between release 2.5.3 and 2.5.4
2.7 Illustrate the upgrade of MDRS155E with Marconi LH
3 Operate the Marconi LH Local Craft Terminal
3.1 Connect the Local Craft Terminal to the equipment
3.2 Practice basic functions like data backup and software
4 Describe the Marconi LH DCN solution
4.1 Explain the basic concept of the SISA and SNMP technology
4.2 Describe and specify the benefits of all DCN operating
5 Configure the system
5.1 Practice all system configurations
5.2 Explain all equipment parameters
5.3 Manage line and radio protection switching solutions
6 Commissioning of the system
6.1 Practice the commissioning wizard
7 Operate and maintain the system
7.1 Back up and restore the equipment database
7.2 Monitor performance data and measuring values
7.3 Monitor alarms
7.4 Execute basic troubleshooting procedures
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Target audience

The target audience for this course is: Network Deployment Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks Overview (LZU1086109). Moreover, they must be experienced in working with a PC and the Windows operating system. Basic knowledge of SISA and IP technology would be advantageous.

Duration and class size

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

Learning situation

This course is based on Instructor Led Training.

It includes instructor-led lessons using power point presentations, hardware and software demonstrations and practical exercises on the hardware and local craft terminal in a classroom with complete Marconi LH equipment setup.

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Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction to SDH microwave radio technology	2 hours
	• Marconi LH System Performance	45 min
	• Marconi LH Application Examples	1 hour 15 min
	• Channel Branching Network	2 hours
2	• Baseband Unit – Functional View	1 hour
	• Baseband Unit – Hardware Components	2 hours
	• Baseband Unit – Service Channel Applications	30 min
	• Baseband Unit – Protection Switching	30 min
	• Transceiver – Functional View and Interfaces	1 hour
	• LMT – Local Maintenance Terminal Introduction	1 hour
3	• Introduction to the SISA Technology	1 hour 30 min
	• Network management connection – Operating Modes	2 hour 30 min
	• LMT – Local Maintenance Terminal – Basic Functions	2 hours
4	• System Configuration	2 hours
	• Measuring Values and Performance Data	1 hour 30 min
	• Alarm Displays and Troubleshooting	1 hour
	• Commissioning Instructions	1 hour 30 min
5	• Introduction to IP and Routing Technology	30 min
	• IP and Routing Configuration	1 hour 30 min
	• System Configuration	1 hour
	• Troubleshooting and Replacement Instructions	3 hours

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MINI-LINK LH R1 Operation and Maintenance

LZU 108 7992 R1A

Description

Will the Native Ethernet Long Haul Microwave Radio System MINI-LINK LH be part of your transport and transmission network? Do you have this system in your sphere of responsibility, but you are not able to operate or configure it reliably within the network? Each network element has specific procedures and special features and functions.

With the help of the training documentation provided in this course and the guidance of the instructors, the attendees will learn the most efficient ways of system operation, maintenance, commissioning, configuration and troubleshooting, hence saving time and money.

Learning objectives

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

1 Understand Transmission fundamentals.

2 Define the different parts in a MINI-LINK LH network element.
2.1 Name the traffic interfaces.
2.2 Recognize the MINI-LINK LH accessories.
2.3 Work with the MINI-LINK LH LCT used for operation and maintenance.

3 Be able to list needed equipment by using defined parameters for a site.

4 Understand the functionalities of the MINI-LINK LH concept.
4.1 Understand the co-functionality between MINI-LINK LH and MINI-LINK TN.
4.2 Understand the co-functionality between MINI-LINK LH and Marconi LH
4.3 Define protection.
4.4 Describe licenses.
4.5 Configure a MINI-LINK LH network element.
4.6 Describe adaptive modulation.

5 Understand the Ethernet functionalities in the MINI-LINK LH.
5.1 Configure Native Ethernet Radio links.

6 Understand basic IP and DCN parts of a MINI-LINK LH network
6.1 Name different DCN interfaces
6.2 Describe static routing and OSPF
6.3 Configure the DCN settings and make the DCN up and running

7 Perform maintenance of a MINI-LINK LH network element
7.1 Define alarms and remove them with help of fault finding
7.2 Perform Configuration backups
7.3 Perform a Software upgrade
7.4 Exchange Plug-In Units
7.5 Create license request

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks Overview (LZU1086109) or Microwave Networks System Survey (LZU 1087348 R2A). Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

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

Learning situation

This course is based on Instructor Led Training.

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

It includes instructor-led lessons using power point presentations, hardware and software demonstrations and practical exercises on the hardware and local craft terminal in a classroom with complete MINI-LINK LH equipment setup.

Time schedule

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

Day	Topics in the course	Estimated time
1	• TBD	

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SE-164 80 Stockholm
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Email: asq.us@ericsson.com
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MINI-LINK CN 500 O&M

LZU 108 7929 R1A

Description

Do you have the right knowledge to work with operation and maintenance of a MINI-LINK CN 500? If not, this is the course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK CN 500 product and its functions. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing operation and maintenance of a MINI-LINK CN 500.

Learning objectives

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

1 Understand Transmission fundamentals.

2 Understand the functionalities of the MINI-LINK CN 500.
2.1 Name the indoor and outdoor parts.
2.2 Name the traffic interfaces.
2.3 Describe Adaptive modulation.
2.4 Configure a MINI-LINK CN 500 network element with the MINI-LINK Craft.

3 Understand the DCN parts of a MINI-LINK CN 500.
3.1 Name different DCN interfaces.
3.2 Configure the DCN settings and make the DCN up and running.

4 Understand the Ethernet functionalities of the MINI-LINK CN 500.
4.1 Configure Ethernet Radio links.

5 Perform maintenance of a MINI-LINK CN 500 network element.
5.1 Define alarms and remove them with help of fault finding.
5.2 Perform Configuration backups.
5.3 Perform a Software upgrade.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of Microwave Networks Overveiw (LZU 1086109 R2A) or similar

knowledge. Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

The length of the course is 1 day and the maximum number of participants is 8.

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• MINI-LINK CN 500 theory	1,5 hours
	• Ethernet functionalities	0,5 hour
	• Maintenance Theory	1 hour
	• Practical Exercises	2,5 hours

Ericsson AB
Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

MINI-LINK CN 210 R1 Operation and Maintenance

LZU 108 7990 R1A

Description

Do you have the right knowledge to work with operation and maintenance of a MINI-LINK CN 210? If not, this is the course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK CN 210 product and its functions. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing operation and maintenance of a MINI-LINK CN 210.

Learning objectives

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

1 Understand Transmission fundamentals.

2 Understand the functionalities of the MINI-LINK CN 210.
2.1 Name the indoor and outdoor parts.
2.2 Name the traffic interfaces.
2.3 Describe Adaptive modulation.
2.4 Configure a MINI-LINK CN 210 network element with the Local Craft Terminal.

3 Understand the DCN parts of a MINI-LINK CN 210.
3.1 Name different DCN interfaces.
3.2 Configure the DCN settings and make the DCN up and running.

4 Understand the Ethernet functionalities of the MINI-LINK CN 210.
4.1 Configure Ethernet Radio links.

5 Perform maintenance of a MINI-LINK CN 210 network element.
5.1 Define alarms and remove them with help of fault finding.
5.2 Perform Configuration backups.
5.3 Perform a Software upgrade.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of Microwave Networks Overveiw (LZU 1086109 R2A) or similar

knowledge. Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

The length of the course is 1 day and the maximum number of participants is 8.

Learning situation

This course is based on Instructor Led Training.

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• MINI-LINK CN 210 theory	1,5 hours
	• Ethernet functionalities	0,5 hour
	• Maintenance Theory	1 hour
	• Practical Exercises	2,5 hours

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SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
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MINI-LINK CN 1010 R1 Operation and Maintenance

LZU 108 7995 R1A

Description

Do you have the right knowledge to work with operation and maintenance of a MINI-LINK CN 1010? If not, this is the course for you.

With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK CN 1010 product and its functions. During the practical exercises and with guidance from the instructors the attendees will learn the most efficient ways of performing operation and maintenance of a MINI-LINK CN 1010.

Learning objectives

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

1 Understand Transmission fundamentals.

2 Understand the functionalities of the MINI-LINK CN 1010.
2.1 Name the traffic interfaces.
2.2 Configure a MINI-LINK CN 1010 network element with the Local Craft Terminal.

3 Understand the DCN parts of a MINI-LINK CN 1010.
3.1 Name different DCN interfaces.
3.2 Configure the DCN settings and make the DCN up and running.

4 Understand the Ethernet functionalities of the MINI-LINK CN 1010.
4.1 Configure the different Ethernet functionalities.

5 Perform maintenance of a MINI-LINK CN 1010 network element.
5.1 Define alarms and remove them with help of fault finding.
5.2 Perform Configuration backups.
5.3 Perform a Software upgrade.

Target audience

The target audience for this course is: Network Deployment Engineer, System Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of Microwave Networks Overveiw (LZU 1086109 R2A) or similar knowledge. Moreover, they must be experienced in working with a PC and the Windows operating system.

Duration and class size

The length of the course is 1 day and the maximum number of participants is 8.

Learning situation

This course is based on Instructor Led Training.

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

Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction	0,5 hour
	• MINI-LINK CN 1010 theory	1,5 hours
	• Ethernet functionalities	0,5 hour
	• Maintenance Theory	1 hour
	• Practical Exercises	2,5 hours

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

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MINI-LINK E Operation & Maintenance

LZU 113 48 R6D

Description

Do you have the right knowledge in MINI-LINK E to work with operation and maintenance in the field in the most efficient way? If not, this course is the one to help you to do that.
With the help of theoretical lectures and exercises a good knowledge in the MINI-LINK E product will be provided. During practical exercises under the guidance from experienced instructor a good knowledge in field installation, commissioning and maintenance of MINI-LINK E will be gained.

Learning objectives

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

1 With the help of MINI-LINK customer documentation and SID on their own perform commissioning of a MINI-LINK E site
1.1 Identify relevant set-up inputs
2 With the help of MINI-LINK customer documentation and SID on their own perform on site maintenance and fault correction
2.1 Fault analyze process
2.2 Unit replacement
2.3 Identify possible fault correction actions
3 On their own and with help from customer documentation handle MINI-LINK E specific tools
3.1 Working with MSM
3.2 Proper use of MINI-LINK E HW tools
4 Identify possible MINI-LINK E configurations to perform a given transmission task.
4.1 Indoor and outdoor HW
4.2 Management network

Target audience

The target audience for this course is: System Technicians, Service Technicians, System Engineers, Service Engineers and Field Technicians.

This audience is responsible for field commissioning and maintenance.

ERICSSON

Prerequisites

The participants should be familiar with the MINI-LINK concept in general, telecommunication and microwave transmission in general, working with Windows operating system and have an understanding of what it means to work in a field maintenance organization.

Successful completion of the following courses: MINI-LINK Installation LZU 108 6144 or have gained similar knowledge about MINI-LINK E installation

Duration and class size

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

Learning situation

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

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Time schedule

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

Day	Topics in the course	Estimated time
1	• Course introduction	45 min
	• MINI-LINK microwave transmission network	45 min
	• MINI-LINK E radio network	2hour 15 min
	• MINI-LINK E traffic network	45 min
	• MINI-LINK E site configuration exercise	1 hour 15 min
2	• MINI-LINK E site configuration exercise, continued	1 hour 15 min
	• MINI-LINK E management network	1 hour 30 min
	• Demonstration of products and accessories	1 hour
	• MINI-LINK E installation	1 hour
	• MSM demonstrations and exercises	1 hour
3	• MSM demonstrations and exercises, continued	6 hour
4	• MSM demonstrations and exercises, continued	1 hour 30 min
	• Functional test	1 hour
	• Fault finding with MSM	1 hour 30 min
	• Summing up	30 min

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Global Services
SE-164 80 Stockholm
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Email: asq.us@ericsson.com
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Short-Haul Microwave Radio Design

LZU 108 6842 R2A

Description

To correctly design a microwave radio network is a task with the utmost importance to the functionallity of a microwave transmission network. Often diversing demands from different legal administrations, needed transmission capacity, required Quality and Availability and equipment properties must be weighted together with atmospheric and geografical properties to find the optimum solution.

Even with the help from modern prediction tools it is in the end the Planner who has to judge if the solution is acceptable or if some of the parameters has to be changed.

This is a delicate but interesting task!

This course gives the participants a good understanding of what planning objectives are applied in a microwave radio network and what parameters influence the performances. By lectures, classroom discussions, and exercises the participants get a solid ground in how to design the microwave radio network to meet stated transmission quality and availability objectives.

Several reference documents for the student's own further studies are included in the course book.

Learning objectives

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

1 Describe the workflow of a generic microwave radio design project
1.1 Transmission target network model
1.2 Nominal planning.
1.3 Site acquisition
1.4 Detailed planning
2 Describe what impact the inputs in prediction tools for equipment, topography and climate properties will have to the path performance.
2.1 Hardware performance
2.2 Free space loss and link budget
2.3 Ground clearance
2.4 Fading from rain and multi-path propagation.
2.5 Ground reflections.
3 Describe the principles for frequency planning.
3.1 Frequency allocation
3.2 Obstacle loss
3.3 Threshold degradation
3.4 Cross polarization discrimination
3.5 Automatic Transmit Power Control
4 Give examples of network topologies and judge where from a microwave radio design point of view a certain topology is suitable.

5 Allocate quality and availability objectives according to applicable ITU-T and ITU-R recommendations.
5.1 ITU-T recommendations G.821, G.826, G.827, G.828
5.2 ITU-R recommendations F.696. F.1668, F.1703.
6 By the help from user documentation use Ericsson microwave prediction tools MLPERF and Tems Linkplanner for designing small microwave networks.

Target audience

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

Prerequisites

The participants should be familiar with transmission networks, with Ericsson microwave equipment and radio communication.

Microwave Networks Overview, LZU 108 6109 (WBL)

Duration and class size

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

Learning situation

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

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Time schedule

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Day	Topics in the course	Estimated time
1	• Course introduction	1 hour
	• Microwave networks topologies	0,5 hour
	• MINI-LINK radio terminal hardware	1 hour 15 min
	• Quality and Availability objectives	1.5 hour
	• Microwave propagation in fading free conditions	1 hour
	• Exercise, Ground clearance	0.5 hour
2	• Fading mechanisms in microwave networks	1 hour
	• Ground reflections	1 hour
	• Frequency planning and Interference calculation	2 hour
	• Microwave planning with ATPC	0.5 hour
	• Designing passive repeaters	1.0 hour
3	• Introduction to MLPERF	0.5 hour
	• Exercise, Path prediction with MLPERF	2 hour 15 min
	• Introduction to Tems Linkplanner	15min
	• Exercise, Network design with Tems Linkplanner	2 hour
	• Summing up	0.5 hour

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SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

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Microwave Networks DCN Design

LZU 108 6146 R4A

Description

To design a microwave radio transmission network is a delicate task. Besides design for traffic handling and microwave radio propagation the Planner must be familiar with how to design the management network.

To in a proper way design the management network is of great importance as network availability is becoming an increasingly important issue, both from customer demand and from economical reality. Furthermore the complexity of modern networks adds on to the Planner's challenge in finding the optimal solution.

By lectures, classroom discussions, and exercises this course will give the participants a solid ground in how to design the Management Data Communication Network for the Ericsson Microwave Networks product range.

Basics about functionality, connectivity and dimensioning of the management tool ServiceOn Microwave is included in this course. For detailed knowledge in how to administrate and operate this please refer to respectively training course.

Learning objectives

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

1 By help from customer documentation identify main Management properties and describe configuration possibilities for MINI-LINK TN, E, and Marconi LH R2.
2 Give examples of management DCN topologies and to judge where a certain topology is suitable.
3 Understand and describe how a management DCN for the above products can be designed.

Target audience

The target audience for this course is: Network Design Engineers,

This audience is responsible for the design of the Management DCN in a microwave transmission network

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks System Survey Course (LZU1086838).

Duration and class size

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

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated time
	• Course Introduction	30 min
	• DCN introduction	30 min
	• DCN bearers	1 hour
	• Generic protocols; Ethernet, IP and OSI	2 hours
	• OSPF routing, fundamentals and design guidelines	1 hour
	• DCN capacity dimensioning guidelines	1 hour
	• MINI-LINK E DCN specifics	1,5 hours
	• MINI-LINK TN R4 DCN specifics	2.5 hours
	• Marconi LH R2 DCN specifics	1,5 hours
	• Interoperability with external equipment; Ericsson Marconi OMS 8xx, 12xx, 16xx and verified third party routers.	30 min
	• ServiceOn Microwave functionality and dimensioning.	30 min
	• DCN design exercises spread over all days	2,5 hour s
	• Summing up	30 min

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

MINI-LINK TN R3 System Planning

LZU1086841 R1A

Description

A transmission network of today employ a varity of techniques, for example traditional PDH and SDH, New Generation SDH, ATM and Ethernet. With all offered possibilites it can be a challeging task to configure the transmission equipment in a complex transport network.

By lectures, classroom discussions, and configuration exercises this course will help the planner in how to configure MINI-LINK TN systems to meet different transport objectives.

MINI-LINK TN is the main focused product in this course but to minor extent it also covers MINI-LINK HC R1 and MINI-LINK E.

This course focuses on System configuration and planning for the different traffic cases of PDH, SDH, Ethernet over PDH and ATM over PDH.

For detailed knowledge in Management Network Design for MINI-LINK TN please refer to the course: Microwave Networks DCN Design, LZU 108 6146.

For detailed knowledge in Microwave Radio Design for MINI-LINK TN please refer to the course: Microwave Radio Network Design, LZU 108 6842.

Learning objectives

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

1. Understand and describe how MINI-LINK TN can be used for transport of PDH, SDH, ATM and Ethernet.
2. From given network topology, traffic capacities and traffic types describe configuration possibilities for MINI-LINK TN, HC and E equipment.
   - Traffic related indoor equipment and configurations.
   - Licenses.
   - DC power.
   - Indoor environment
3. Understand how to estimate needed traffic capacity in cellular radio access networks; RAN.
   - Transmission in GSM RAN
   - Transmission in WCDMA RAN
4. Give examples of network topologies and be able to judge where a certain topology is suitable from a traffic point of view.
5. Understand and describe how to calculate needed number of spare units.

Target audience

The target audience for this course is: Network Design Engineer

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks System Survey Course (LZU1086838). Knowledge of transmission in cellular network would be advantageous.

Duration and class size

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

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment. It holds network and equipment configuration exercises on paper to let the students practice knowledge gained from the theoretical lessons.

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
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Time schedule

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

Day	Topics in the course	Estimated time
1	• Course Introduction	1 hour
	• MINI-LINK TN System Description	1 hour 45 min
	• MINI-LINK TN Hardware Configuration	1 hour
	• MINI-LINK TN Feature Licenses	30 min
	• MINI-LINK HC R1 System Description and Hardware Configuration	30 min
	• MINI-LINK E System Description and Hardware Configuration	45 min
2	• Access transport network, lecture and exercise	2 hour 45 min
	• TDM Traffic Routing and ATM VP/VC Cross-connect	1 hour
	• Synchronization Network	45 min
	• Ethernet Transport	1 hour
3	• MINI-LINK Radio Network	1 hour
	• Spare part dimensioning	30 min
	• Access Transport Network Design Exercise	3 hour 45 min
	• Summing up	30 min

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
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Marconi LH R2 System Planning

LZU1086713 R3A

Description

Will the SDH Long Haul Microwave Radio System Marconi LH be part of your transport and transmission network? Would you like to ensure the optimum use of this system? Each network element has specific procedures and special features and functions.

With the help of the training documentation provided in this course and the guidance of the instructors, the attendees will learn the most efficient ways of system and station planning, hence saving time and money. Moreover, they will know how to ensure the optimum use of these systems.

The radio hop planning process is not part of this training course.

Learning objectives

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

1 Describe the Marconi LH equipment
1.1 Define the benefits and performance of the Marconi LH
1.2 Illustrate the Marconi LH system application
2 Describe the microwave radio technologies
2.1 Explain the ATPC, Diversity and XPIC operation
3 Plan the connection between Transceiver and antenna
3.1 Describe the channel branching network
3.2 Explain the waveguide and dehydrator technology
4 Plan the Marconi LH subracks
4.1 Describe the hardware components
4.2 Understand all line and radio protection concepts
4.3 Explain the delta between release 2.5.3 and 2.5.4
4.4 Discuss service channels supported
5 Design the Marconi LH DCN solution
5.1 Explain the basic concept of the SISA and SNMP technology
5.2 Describe and specify the benefits of all DCN operating

Target audience

The target audience for this course is: Network Design Engineer

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks Overview Course (LZU 108 6109). Basic knowledge of SISA and IP technology would be advantageous.

Duration and class size

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

Learning situation

This course utilizes Instructor Led Training.

It includes instructor-led lessons using power point presentations, hardware demonstrations and planning exercises.

Time schedule

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

Day	Topics in the course	Estimated time
1	• Marconi LH System Performance	1 hour
	• Marconi LH Planning Examples	1 hour
	• Microwave radio technology (Diversity, XPIC, ATPC)	1 hour
	• Channel Branching Network	2 hours
	• Waveguide, Dehydrator and Antenna	1 hour 30 min
2	• Rack configuration and Power supply	30 min
	• Baseband Unit – Hardware Components	2 hours
	• Baseband Unit – Service Channel Application	30 min
	• Baseband Unit – Protection Concept	30 min
	• Introduction to the SISA and SNMP Technology	1 hour
	• Network management connection – QD2, OSI , IP	1 hour

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Global Services
SE-164 80 Stockholm
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Email: asq.us@ericsson.com
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MINI-LINK System Planning

 LZU 108 8064 R1A

Description

A transmission network of today employ a varity of techniques, for example traditional PDH and SDH, ATM and Ethernet. With all offered possibilites it can be a challeging task to configure the transmission equipment in a complex transport network.

By lectures, classroom discussions, and configuration exercises this course will help the planner in how to configure MINI-LINK systems to meet different transmission challenges.

This course focuses on System configuration for different traffic cases of;
PDH and Super PDH traffic,
SDH traffic including ADM functionality,
Ethernet traffic directly over radio (Native Ethernet) and over PDH and SDH
Ethernet traffic handling in the embedded Layer 2 Switch, VLAN and priority functionality
ATM cross connect and transport of ATM over PDH.
Synchronization issues.

Traffic dimensioning and network topology examples are taken from GSM and WCDMA Radio Access Networks.

This course covers and concentrates on functionality for MINI-LINK TN up to release 4.4. To a minor extent it also covers MINI-LINK CN products and MINI-LINK E.

For detailed knowledge in Management Network Design please refer to the training course: Microwave Networks DCN Design, LZU 108 6146.
For detailed knowledge in designing the microwave radio network please refer to the training course: Short-haul Microwave Radio Network Design, LZU 108 6842.

Learning objectives

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

1 Understand and describe how MINI-LINK TN R4.4 can be used for transport of PDH, SDH, ATM and Ethernet
1.1 ETSI and ANSI PDH transport and Traffic Routing
1.2 SDH regenerator, Add-drop multiplexer, Cross-connector
1.3 ATM over E1 and ATM Cross-connect.
1.4 Ethernet over radio, PDH and SDH, Ethernet switching.
2 From given network topology, traffic capacities and traffic types describe configuration possibilities and requirements for MINI-LINK TN and E equipment
2.1 Traffic related indoor equipment and configurations
2.2 Feature licenses.
2.3 DC power requirement
3 Understand how to estimate needed transmission capacity in cellular radio access networks.
3.1 GSM RAN built on TDM technology

3.2 WCDMA RAN over ATM
3.3 WCDMA RAN over Ethernet
4 Give examples of network topologies and be able to judge where a certain topology is suitable from a traffic point of view
5 Describe how to estimate needed number of spare units

Target audience

The target audience for this course is: Network Design Engineers, Network Deployment Engineers.

Prerequisites

Successful completion of the following courses: Microwave Networks Overview, LZU 108 6109 R3A.

Duration and class size

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

Learning situation

This course is based on theoretical instructor-led lessons given in a classroom environment. It holds network and equipment configuration exercises on paper to let the students practice knowledge gained from the theoretical lessons.

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
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Time schedule

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Day	Topics in the course	Estimated time
1	• Course introduction	1 hour
	• Access Transport Network, GSM and WCDMA	1 hour
	• Access Transport Network Design exercise	2 hour
	• MINI-LINK TN R4 Basic Node	30min
	• MINI-LINK TN R4 Radio Terminals	30min
	• MINI-LINK TN R4 TDM Traffic Handling	45min
2	• MINI-LINK TN R4 ATM Traffic Handling	1 hour
	• MINI-LINK TN R4 SDH Traffic Handling	45min
	• MINI-LINK TN R4 Ethernet Traffic Handling	2 hour
	• MINI-LINK TN R4 system configuration exercise	2 hour 30min
3	• MINI-LINK TN R4 Synchronization Network, lecture and exercise	1 hour
	• MINI-LINK TN R4 Feature Licenses, lecture and exercise	30min
	• MINI-LINK E System Description, lecture and exercise	1 hour 30 min
	• MINI-LINK CN Product Descriptions	30 min
	• MINI-LINK Outdoor Units	45min
	• MINI-LINK Power Consumption	45min
	• MINI-LINK Spare Part Dimensioning	30 min
	• Summing up	30 min

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
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MDRS155E R2 Operation and Maintenance

LZU1086675 R1A

Description

Will the SDH Long Haul Microwave Radio System MDRS155E be a part of your transport and transmission network? Do you have this system in your shere of responsibility, but you are not able to operate or configurate reliably within the network? Each network element has specific procedures and special feature and functions.

With the help of the training documentation provided in this course, and the guidance of the Instructors, the attendees will be able to learn the most efficient ways of sytem operation, maitenance, commissioning, configuration and troubleshooting, hence saving time and money.

Learning objectives

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

1. Describe the basic concepts of SDH microwave radio technologies
   - Explain the benefits and characteristics of XPIC operation
   - Explain the benefits and characteristics of protection variants
2. Describe the MDRS155E equipment
   - Define the benefits and performance of the MDRS155E equipment
   - Illustrate the MDRS155E system application
   - Describe the channel branching network
   - Describe the function of subracks and hardware components
   - Discuss service channels supported
3. Run the MDRS155E Local Craft Terminal
   - Connect the Local Craft Terminal to the equipment
   - Explain the basic LCT function
   - Practice basic functions like data backup and software download
4. Describe the MDRS155E DCN solution
   - Explain the basic concept of the SISA technology
   - Describe and specify the benefits of all DCN operating modes
5. Configure the system
   - Describe and practice all system configurations
   - Explain all equipment parameters
   - Manage protection switching options
6. System commissioning
7. Operate and maintain the system
   - Back up and restore the equipment database
   - Monitor performance data and measuring values
   - Monitor alarms
   - Execute basic troubleshooting procedures

Target audience

The target audience for this course is: Network Deployment Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the Microwave Networks System Survey Course (LZU1086838). Moreover, they must be experienced in working with a PC and the Windows operating system. Basic knowledge of SISA and IP technology would be advantageous.

Duration and class size

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

Learning situation

This course utilizes Instructor Led Training.

The course consists of instructor-led lessons using power point presentations, hardware and software demonstrations and practical exercises with the hardware and local craft terminal in classroom with complete set-up of MDRS155E equipment.

Ericsson AB
Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Time schedule

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

Day	Topics in the course	Estimated time
1	• MDRS155E system (System design and performance features; MDRS155E application examples; Protection concept and XPIC functionality; Mounting instructions; Practical exercises)	5 hours
	• Transmitter / Receiver (Functional view; Interfaces and technical characteristics)	1 hour
2	• Modem Unit (Hardware components; Functional view and protection switching; Alarm displays and handling; Interfaces and technical characteristics; Practical exercises)	4 hours
	• RPS-C / RPS-H (Functional view and interfaces)	1 hour
	• Overhead Access Unit (Hardware components; service channels; Functional view and service channel applications)	1 hour
3	• Network management connection (Introduction to the SISA technology; QD2 and OSI connection; IP connection (Routing); Examples and practical exercises)	3 hours
	• Overhead Access Unit (Hardware components; Network Management)	2 hours
	• MSP – Modular Service PC (Introduction to the MSP software; PC connection and remote access)	1 hour
4	• MSP – Modular Service PC (Software structures; Software download and data backup; Measuring values and performance data; System configuration using the MSP)	5 hours
	• Commissioning instructions (Commissioning and practical exercises)	1 hour
5	• Systematic troubleshooting on the system (Replacement instructions)	6 hours

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Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

MDRS155S R5 Operation and Maintenance

LZU1086674 R2A

Description

Will the SDH Short Haul Microwave Radio System MDRS155S be a part of your transport and transmission network? Do you have this system in your shere of responsibility, but you are not able to operate or configurate reliably within the network? Each network element has specific procedures and special feature and functions.

With the help of the training documentation provided in this course, and the guidance of the Instructors, the attendees will be able to learn the most efficient ways of sytem operation, maitenance, commissioning, configuration and troubleshooting, hence saving time and money.

Learning objectives

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

1. Describe the basic concepts of SDH microwave radio technologies
   - Explain the benefits and characteristics of XPIC operation
   - Explain the benefits and characteristics of protection variants
2. Describe the MDRS155S equipment
   - Define the benefits and performance of the MDRS155S equipment
   - Illustrate the MDRS155S system application
   - Describe the channel branching network
   - Describe the function and interfaces of all indoor unit versions
   - Discuss service channels supported
   - Describe the function and interfaces of all outdoor unit versions
3. Run the MDRS155S Local Craft Terminal
   - Connect the Local Craft Terminal to the equipment
   - Explain the basic LCT function
   - Practise basic functions like data backup and software download
4. Describe the MDRS155S DCN solution
   - Explain the basic concept of the SISA technology
   - Describe and specify the benefits of all DCN operating modes
5. Configure the system
   - Describe and practise all system configurations
   - Explain all equipment parameters
   - Manage protection switching options

6. System commissioning
    Describe and practise the commissioning wizard
7. Operate and maintain the system
    Back up and restore the equipment database
    Monitor performance data and measuring values
    Monitor alarms
    Execute basic troubleshooting procedures

6

Target audience

The target audience for this course is: Network Deployment Engineer, Field Technician

Prerequisites

The participants should be familiar with digital transmission fundamentals and the subjects/contents of the MINI-LINK Installation (LZU1086144) and Microwave Networks System Survey Course (LZU1086838) Course. Moreover, they must be experienced in working with a PC and the Windows operating system. Basic knowledge of SISA and IP technology would be advantageous.

Duration and class size

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

Learning situation

This course is based on Instructor Led Training.

It includes instructor-led lessons using power point presentations, hardware and software demonstrations and practical exercises on the hardware and local craft terminal in a classroom with complete MDRS155S equipment setup.

Ericsson AB
Global Services
SE-164 80 Stockholm
Telephone: +46 10 719 0000
Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Time schedule

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

Day	Topics in the course	Estimated time
1	• Introduction to SDH microwave radio technology	30 min
	• MDRS155S Application Examples	1 hour
	• Channel Branching Network	30 min
	• Indoor Unit – Functional View	30 min
	• Indoor Unit – Hardware Components	1 hour
	• Indoor Unit – Service Channel Applications	30 min
	• Indoor Unit – Protection Switching	30 min
	• Outdoor Unit – Functional View and Interfaces	1 hour 30 min
2	• LMT – Local Maintenance Terminal Introduction	1 hour 30 min
	• Measuring Values and Performance Data	1 hour 30 min
	• Alarm Displays and Troubleshooting	30 min
	• System Configuration	1 hour 30 min
	• Commissioning Instructions	1 hour
3	• Introduction to the SISA Technology	1 hour
	• Network management connection – Operating Modes	1 hour
	• Introduction to IP and Routing Technology	1 hour
	• IP and Routing Configuration	1 hour 30 min
	• Troubleshooting and Replacement Instructions	1 hour 30 min

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Global Services

MINI-LINK HC Operation & Maintenance

LZU 113 302 R2C

Description

Do you have the right knowledge in MINI-LINK HC to work with operation and maintenance in the field in the most efficient way? If not, this course is the one to help you to do that. With the help of theoretical lectures and exercises a good knowledge in the MINI-LINK E product will be provided. During practical exercises under the guidance from experienced instructor a good knowledge in field installation, commissioning and maintenance of MINI-LINK HC will be gained.

Learning objectives

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

1 With the help of MINI-LINK customer documentation and SID on their own perform commissioning of a MINI-LINK HC site.
1.1 Identify relevant set-up inputs
2 With the help of MINI-LINK customer documentation and SID on their own perform on site maintenance and fault correction
2.1 Fault analyze process
2.2 Unit replacement
2.3 Identify possible fault correction actions
3 On their own and with help from customer documentation handle MINI-LINK HC specific tools
3.1 Working with LCT
3.2 Proper use of MINI-LINK HC HW tools
4 Identify possible MINI-LINK HC configurations to perform a given transmission task.
4.1 Indoor and outdoor HW
4.2 Management network

Target audience

The target audience for this course is: System Technicians, Service Technicians, System Engineers, Service Engineers and Field Technicians.
This audience is responsible for field commissioning and maintenance.

Prerequisites

The participants should be familiar with the MINI-LINK concept in general, telecommunication and microwave transmission in general, IP addressing, working with Windows operating system and have an understanding of what it means to work in a field maintenance organization.

Successful completion of the following courses: MINI-LINK Installation LZU 108 6144 or have gained similar knowledge about MINI-LINK HC installation

Duration and class size

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

Learning situation

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

Ericsson AB
Global Services
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Email: asq.us@ericsson.com
www.ericsson.com/globalservices

Time schedule

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate. (This paragraph is mandatory).

Day	Topics in the course	Estimated time
1	• Course introduction	30 min
	• MINI-LINK HC system overview	30 min
	• MINI-LINK HC radio network	1 hour 45 min
	• Synchronous transmission technique	1 hour
	• MINI-LINK HC traffic network	45 min
	• IP DCN basics	1 hour
	• IP addressing exercise	30 min
2	• MINI-LINK HC management network	1 hour 45 min
	• MINI-LINK HC commissioning exercises with LCT	4 hour 15 min
3	• MINI-LINK HC maintenance theory	1 hour
	• MINI-LINK HC maintenance exercise	3 hour 30 min
	• Functional test	1 hour
	• Sum-up of the course	30 min

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MINI-LINK TN Operation & Maintenance

LZU 108 6011 R3C

Description

Do you have the right knowledge to work with operation and maintenance in a MINI-LINK TN network? If not, this is the course for you.
With the help of the theoretical lessons the attendees will get a good knowledge about the MINI-LINK TN products. During the practical exercises the attendees will get guidance from the instructors and they will be able to learn the most efficient ways of performing operation and maintenance of a MINI-LINK TN network.

Learning objectives

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

1 Have a basic knowledge about transmission fundamentals
2 Define the different parts in a MINI-LINK TN network element
2.1 Indoor parts: Radio terminal and Basic Node
2.2 Outdoor parts: Radio and antennas
2.3 Traffic interfaces
3 Define the functionalities in the MINI-LINK TN concept
3.1 Traffic routing
3.2 Protection
3.3 Multi/demultiplexer (PDH/SDH)
3.4 Synchronization
3.5 Ethernet traffic
4 Recognize the MINI-LINK TN accessories
4.1 Cables and connectors
4.2 Installation accessories
5 Be able to list needed equipment by using defined parameters for a site
6 Have a basic knowledge about the DCN parts in a MINI-LINK network
6.1 Routers
6.2 Interfaces: PPP, LAN ports, E1/DS1 for DCN
6.3 DCN routing tables
7 Recognize the Local Craft Terminal user for operation and maintenance
8 Configuration of a MINI-LINK TN network
9 Successfully configure a MINI-LINK TN network element
9.1 Initial settings for the Radio terminal and the Basic Node
9.2 Set traffic routing and Ethernet connections
9.3 Set up a ring protection on a E1/DS1 level
9.4 Set the DCN settings and get the DCN up and running
9.5 Define alarms and remove them whit help of fault finding
9.6 Perform a software upgrade on the MINI-LINK TN network element

Target audience

The target audience for this course are:

Planning, Design and Deployment
Operations
Field Operations

Prerequisites

The participants should be familiar with

Basic knowledge in telecommunications, transmission techniques and data comunication.
Working in Windows operating system environment.
MINI-LINK System Survey LZU 108 6108 or MINI-LINK Installation LZU 108 6144 or similar knowledge.

Duration and class size

The length of the course is 4 days and the maximum number of participants is 8
The number of participants should only be 8 for practical courses and 16 for theory courses.

Learning situation

This course utilizes Instructor Led Training.

The course consists of instructor-led lessons using power point presentations, hardware demonstrations and practical exercises in classroom and in lab environment using live MINI-LINK equipment

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Time schedule

The time required always depends on the knowledge of the attending participants and the hours stated below can be used as estimate. (This paragraph is mandatory).

Day	Topics in the course
1	• Intro
	• Transmission Overview
	• Radio Overview
	• MINI-LINK TN System Description
2	• MINI-LINK TN Features
	• Accessories
	• MINI-LINK TN System Configuration Exercise
	• MINI-LINK TN Network Management
3	• Local Craft Terminal (LCT) Demo and practical exercises
4	• Local Craft Terminal (LCT) Demo and practical exercises
	• Summing up

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