



Optical Transport 2018 Training Programs

Catalog of Course Descriptions





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ASON/WSN FUNDAMENTALS	5
BGP OVERVIEW & FUNDAMENTALS	7
ETHERNET OAM ENHANCEMENT	10
ETHERNET STANDARDS.....	12
ETHERNET TRANSPORT OVERVIEW & FUNDAMENTALS.....	14
IP MULTICAST OVERVIEW & FUNDAMENTALS	16
IP OVERVIEW & FUNDAMENTALS.....	19
IP ROUTING OVERVIEW & FUNDAMENTALS	21
IP-QOS OVERVIEW & FUNDAMENTALS	23
IS-IS OVERVIEW & FUNDAMENTALS.....	26
MPLS L2VPN OVERVIEW & FUNDAMENTALS	28
MPLS OVERVIEW & FUNDAMENTALS	31
OSPF OVERVIEW & FUNDAMENTALS.....	33
OTN FUNDAMENTALS.....	35
WDM OVERVIEW AND FUNDAMENTALS.....	37
SPO 1400 R16 BASIC COMMISSIONING.....	39



SPO 1400 R16 CIRCUIT EMULATION AND SYNCHRONIZATION OPERATIONS41

SPO 1400 R16 ETHERNET OPERATIONS43

SPO 1400 R16 MAINTENANCE AND ADVANCED TROUBLESHOOTING.....45

SPO 1400 R16 PDH/SDH OPERATIONS.....47

FRONTHAUL 6080 R17 OPERATION AND MAINTENANCE.....49

SPO 1400 QUALITY OF SERVICE52

SPO 1400 R17 MPLS-TP OPERATIONS54



SPO 1400 R17 OTN/WDM COMMISSIONING AND OPERATIONS56



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)
	eLearning (WBL)



ASON/WSON Fundamentals



LZU 108 9280 R1A

Description

During this course we are going to focus on:

- An introduction to ASON/WSON technology
- A description of the ASON/WSON Control Plane
- A description of the ASON / WSON Protections

Learning objectives

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

- 1 Describe what ASON is and which are the main characteristics.
- 2 Differentiate between ASON and WSON
- 3 Understand how WSON works and the relevant characteristics in terms of control plane and protection schemes introduced into the WDM layer

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

There are no prerequisites for this course

Duration and class size

The length of the course is 1 hour.

Learning situation

This is a self-paced web-based course



**Time schedule**

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

Day	Topics in the course	Estimated Time (hours)
	Introduction to the course	
	ASON/WSON Technology	
	ASON/WSON Control Plane	
	ASON/WSON Protections	
	Summary	



BGP Overview & Fundamentals



LZU 108 8532 R1A

Description

BGP Overview & Fundamentals consists of 2 modules: BGP Overview and BGP Fundamentals. Both parts end with a Knowledge Assessment.

BGP Overview module describes the background to BGP, what BGP is, reasons for using BGP and the different types of deployment scenarios for BGP.

BGP Fundamentals module describes what BGP is, why we use it and how it works. It also goes deeper into the peering process, how BGP shares prefixes and what attributes are used in path selection

Learning objectives

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

- 1 Know what Border Gateway Protocol (BGP) is
- 2 Understand why operators need to use BGP
- 3 Describe the market driver for BGP
- 4 Explain the way operators use BGP
- 5 Know the typical deployment scenarios for BGP
- 6 Appreciate the value it provides to the customers from technical point of view
- 7 Understand how BGP can be used by different groups of customers (Enterprises, Service Providers)
- 8 Explain what makes BGP different from other routing protocols
- 9 Describe how BGP works
- 10 Understand what a Finite State Machine is
- 11 Explain the different states in the BGP peering process and what messages are sent between each state.
- 12 Describe the different attributes that BGP sends and how these are used to select the best path.
- 13 Understand what BGP route Summarization is and why it important





- 14 Explain what makes BGP different from other routing protocols
- 15 Appreciate the challenges with worldwide BGP routing

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593
OSPF <u>or</u> IS-IS Overview & Fundamentals	LZU 108 8536 <u>or</u> LZU 108 8534

Duration and class size

The length of the course is appr.1.3 hour.

Learning situation

This is a self-paced web based course



Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Growth in the Internet BGP Concepts What is BGP Why BGP BGP Routing Policy Typical Deployment Scenarios How BGP works BGP Peering Sharing Prefixes BGP Attributes Summary	



Ethernet OAM Enhancement



LZU 108 8518 R1A

Description

This course provides information about protocols used for Ethernet OAM (Operation Administration and Maintenance). It explains functionality provided by 802.1ag, 802.3ah and Y.1731 protocols. This course requires good understanding of Ethernet fundamentals

Learning objectives

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

- 1 Understand protocols used for Ethernet OAM (Operation Administration and Maintenance)
- 2 Understand the functionality provided by 802.1ag, 802.3ah and Y.1731 protocols

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

Ethernet Transport Overview and Fundamentals, LZU1088519

Duration and class size

The length of the course is 1 hour

Learning situation

This is a self paced web based course



**Time schedule**

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

Day	Topics in the course	Estimated Time (hours)
	What is Ethernet OAM	
	Why Ethernet OAM is needed	
	Ethernet OAM Environment	
	802.3ah Protocol	
	802.1ag Protocol	
	Ethernet Maintenance Levels	
	ITU Y.1731	
	Summary	

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Ethernet Standards



LZU 108 7591 R1A

Description

Ethernet is becoming one of the main standard communication protocols used in transport networks to handle the requirements of transporting data traffic in the networks in an efficient way.

Do you have the competence required to handle this?

This course covers the basics of Ethernet and related standards. The objectives of this course will be the prerequisites for many of the product Operations and Operation and Maintenance courses

Learning objectives

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

- 1 Understand the structure of the Ethernet frame and MAC address format
- 2 Describe the differences between bridging and switching
- 3 Understand Ethernet framing, Ethernet over PDH and Ethernet over SDH
- 4 Define and understand different Ethernet protection protocols
- 5 Understand the Operations, Administration and Maintenance (OAM) features of Ethernet
- 6 Define which traffic management mechanisms are available to manage Ethernet traffic performance assurance
- 7 Understand the use of IGMP over L2 Switches
- 8 Describe T-MPLS and PBT (PBB-TE)

Target audience

The target audience for this course is:

Fundamentals





Prerequisites

Successful completion of the following courses:

There are no prerequisites for this course

Duration and class size

The length of the course is appr. 2 hours.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Introduction Bridge and Switching Ethernet Services Ethernet over PDH and SDH Ethernet Protections Ethernet OAM Traffic Management IGMP over Layer 2 Switch T-MPLS and PBT Test	

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Ethernet Transport Overview & Fundamentals



LZU 108 8519 R1A

Description

This course is made of two modules. First the Overview module that gives an introduction into Carrier Ethernet. It explains the need for Carrier Ethernet when building a common Ethernet transport network. It describes the key attributes that make it different from LAN-based Ethernet, and the role of Metro Ethernet Forum in promoting Carrier Ethernet.

The second module is the "Ethernet Transport Fundamentals, web based learning module. This module describes the Ethernet protocol in detail and key concepts Ethernet is based on. It also gives in depth explanation of some of the features Ethernet offers. Telecom Grade Ethernet is also described and the different Telecom Grade Ethernet Solutions are explained."

Both modules end with a knowledge assessment

Learning objectives

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

- 1 Describe the concept and solution of Carrier Ethernet
- 2 To learn about challenges in Telco Networks
- 3 To know the background on Ethernet
- 4 To know about Carrier Ethernet Services
- 5 Describe the Ethernet Protocol
- 6 Explain how Ethernet Works
- 7 Compare the different Ethernet Link Types
- 8 Describe Ethernet Bridging and Switching
- 9 Explain Ethernet Loop Avoidance
- 10 Describe the Rapid Spanning Tree Protocol
- 11 Explain the operation of Ethernet VLANs and the IEEE802.1q Protocol
- 12 Describe Ethernet Resiliency and Link Aggregation
- 13 Describe Ethernet Ring Protection





- 14 Understand Provider Bridging - QinQ
- 15 Understand Provider Backbone Bridging Mac-in-Mac

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

Ethernet Standards LZU 108 7591

Duration and class size

The length of the course is appr. 1 hour.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	BGP Concepts What is BGP Why BGP How BGP works BGP Peering Sharing Prefixes BGP Attributes Summary	

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IP Multicast Overview & Fundamentals



LZU 108 8529 R1A

Description

IP Multicast Overview & Fundamentals is a combination of 2 modules: Multicast Overview and Multicast Fundamentals.

Both parts end with a Knowledge Assessment.

Multicast Overview module describes on a high level, what Multicast is and the benefits it has over other types of data transmission. It also explains what applications are possible with Multicasting.

Multicast Fundamentals module describes what Multicast is, why we use it and how it works. It describes the functionality of Multicast and the benefits associated. It also describes in detail all components of the multicast architecture

Learning objectives

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

- 1 Describe what Multicasting is
- 2 Understand the benefits Multicast has over Unicast and Broadcast
- 3 Explain when Multicast should and should not be used
- 4 Outline why ISP's need IP multicast technologies
- 5 Discuss the ways in which real-time applications use Multicast technology
- 6 Explain the IP multicast model and its applications
- 7 Understand the Multicast architecture
- 8 Explain Multicast addressing
- 9 Outline Multicasting at Layer 2
- 10 Discuss the concept of a Multicast distribution tree
- 11 Explain how multicast routing is different from Unicast routing
- 12 Detail all actions of a router when it receives a multicast packet
- 13 Understand the role of TTL thresholds
- 14 Explain Internet Group Management Protocol





- 15 Describe IGMP Snooping
- 16 List the different Multicast Routing Protocols Categories

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593

Duration and class size

The length of the course is appr. 2 hours.

Learning situation

This is a self-paced web based course



Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	What is IP Multicast? IP Transmission Types Advantages of Multicast Disadvantages with Multicast Multicast Applications IP Multicast Model Multicast Architecture Multicast Addressing IGMP Multicast Distribution Trees Multicast Routing Reverse Path Forwarding TTL Thresholds	

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IP Overview & Fundamentals



LZU 108 8538 R1A

Description

This course contains of two parts: Overview and Fundamentals. Both ends with knowledge assessments.

The first part gives an introduction into IP. It gives a short historic perspective. It explains the business drivers behind IP, how the networks are evolving to "all-IP", and how IP packet networks are different from circuit based telephony networks.

The second part is made for people who want more technical detail. Fundamentals presents the main concepts behind the IP protocol.

Learning objectives

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

- 1 Learn about the business drivers for IP
- 2 Learn about the historical background
- 3 Learn about how the industry is going towards all-IP
- 4 Learn about packet switching versus circuit switching
- 5 Understand what is TCP/IP
- 6 Know the IPv4 Packet Structure
- 7 Know the IPv4 Address Schema
- 8 Know about classless IP addressing
- 9 Learn about the life of an IP Packet

Target audience

The target audience for this course is:

Fundamentals





Prerequisites

Successful completion of the following courses:

There are no prerequisites for this course

Duration and class size

The length of the course is appr. 1.25 hours

Learning situation

This is a self-paced web-based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Business drivers for IP Historical background of IP How is the industry going towards all-IP? Packet switching versus circuit switching approach What is IP? What id TCP/IP? OSI Model IPv4 Package structure 32-bit address scheme of IPv4 IP addressing	

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IP Routing Overview & Fundamentals



LZU 108 8593 R1A

Description

This course consists of two modules, IP Routing Overview and IP Routing Fundamentals. The IP Routing Overview module describes what IP Routing is, why we use it and how it works. It describes the different types of routing available. It also describes the difference between switching and routing

The IP Routing Fundamentals module describes how IP packets are transmitted in an IP network. Provides information about how Routing Table is populated with route data. The purpose and main functionalities of Dynamic Routing protocols. It also presents techniques to reduce the size of Routing Tables

Learning objectives

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

- 1 Know the basics of IP routing
- 2 Describe how IP addresses and subnet masks used
- 3 Understand the differences between routing and switching
- 4 Know what routers and routing tables are
- 5 Compare static versus dynamic routing protocols
- 6 Understand the difference between interior and exterior routing protocols
- 7 Describe what IP routing is
- 8 Understand how IP packets are transmitted
- 9 Know the purpose and main characteristics of dynamic routing protocols
- 10 Compare Distance Vector and Link State Advertisement routing protocols
- 11 Understand the function of a Default Gateway router
- 12 Define what is Route summarization
- 13 Tell how does Administrative Distance influence route selection
- 14 Describe the importance of Convergence Time



**Target audience**

The target audience for this course is:
Fundamentals

Prerequisites

Successful completion of the following courses:
IP Overview & Fundamentals LZU 108 8538

Duration and class size

The length of the course is appr. 0.77 hour.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	What is IP Routing IP addressing Routing and Switching Routers and Routing Tables Static versus Dynamic Routing Protocols Interior versus Exterior Routing Protocols Packet Transmission Routing Protocols Default Gateways Summarization Administrative Distance Convergence Time	

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IP-QoS Overview & Fundamentals



LZU 108 8528 R1A

Description

The overview module describes what IP QoS is, why we use it and on a very high-level what are the requirements and how it works. It compares IP QoS to a road network and uses this analogy to explain certain topics. It also describes briefly about DiffServ and QoS marking

The Fundamentals module describes what IP QoS is, why we use it and how it works. It reviews a few concepts related to QoS, including throughput, delay, jitter and loss. It examines how IP Precedence is used and how this evolved to Differentiated Services. It describes the different roles and functions of all components that make up a DiffServ. It also describes congestion avoidance mechanisms and how IP QoS is mapped into layer 2 headers

Learning objectives

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

- 1 Know why we use QoS
- 2 Understand congestion avoidance
- 3 Explain the benefits of QoS to a service provider
- 4 Identify the benefits of QoS to an end user
- 5 Understand some typical deployment scenarios
- 6 Understand why previously used best-effort approach was sufficient but is now unsuitable for triple play services.
- 7 Revise the concepts of throughput, delay, jitter and loss.
- 8 Describe Integrated Services.
- 9 Understand per-hop processing.
- 10 Understand how IP Precedence is used.
- 11 Know how IP Precedence evolved to Differentiated Services (DS).
- 12 Be aware of the different DS components.
- 13 Explain the different DiffServ functions like classification, marking, policing, queuing and scheduling.





- 14 Describe how the concept of the Token Bucket works.
- 15 Identify and explain different congestion avoidance mechanisms like RED and WRED.
- 16 Understand where the IP QoS marking is mapped into Layer 2 headers

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593

Duration and class size

The length of the course is appr. 1.75 hours.

Learning situation

This is a self-paced web based course

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Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Why QoS Congestion Avoidance Benefits of QoS to the Service Provider Benefits of QoS to the End User Typical Deployment Scenarios Network Requirements Addressing QoS Requirements IP Precedence Differentiated Services DS Components DiffServ Functions Congestion Avoidance IP QoS in Layer 2	

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IS-IS Overview & Fundamentals



LZU 108 8534 R1A

Description

This course consists of two parts: one overview and one fundamentals.

The Overview part provides introduction to the topic on a high level.

It provides a high level introduction to Intermediate System to Intermediate System (IS-IS).

It explains ISIS role in Internet Protocol (IP) and Open Systems Interconnection (OSI) environments.

The Fundamentals part provides the essential information about the topic one must know prior to moving into the more detailed information of the topic.

Fundamentals are addressing the pre-requisite elements of the topic.

The Fundamentals part covers technology background of Intermediate System to Intermediate System (IS-IS) protocol.

It provides the essential information about ISIS.

Learning objectives

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

- 1 Understanding Intermediate System to Intermediate System (ISIS) role in data networks
- 2 Understanding key concepts of Intermediate System to Intermediate System (ISIS)

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593



**Duration and class size**

The length of the course is appr. 1 hour.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	IS-IS Concepts Link State Database – Building common network view – Creating network topology – Topology of a broadcast network – Calculating best paths Neighbor Discovery Area Concept – Finding way out of L1 area – Suboptimal routing between areas IP Prefix Redistribution into IS-IS OSI addressing schema	



MPLS L2VPN Overview & Fundamentals



LZU 108 8513 R1A

Description

L2VPN Overview & Fundamentals is a combination of 2 modules, the overview course and the fundamentals course. Both courses end with a Knowledge Assessment.

MPLS VPN's Overview module describes what MPLS VPN's are, why we use them and on a very high-level what are the requirements and how they work. It describes the different models for a VPN Service. It also describes briefly about MPLS VPN's.

MPLS L2VPN Fundamentals module describes what MPLS L2VPN is, why we use it and how it works. It describes the different roles and functions of all components that make up a MPLS L2VPN Service. It also describes in detail the different MPLS L2VPN services

Learning objectives

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

- 1 Know what a Virtual Private Network is (VPN).
- 2 Understand the business drivers for VPN's.
- 3 Explain the requirements of a VPN service.
- 4 Identify different VPN models.
- 5 Understand what an MPLS L3VPN is.
- 6 Understand what an MPLS L2VPN is.
- 7 Define the benefits of using MPLS VPN's.
- 8 Know why L2VPNs are used
- 9 Understand the how MPLS is used to setup L2VPNs
- 10 Revise MPLS and label switching
- 11 Describe the signaling that occurs to set up a L2VPN network
- 12 Understand the different L2VPN services – VPWS and VPLS
- 13 Understand the PWE3 Framework
- 14 Know the PW parameters and how they are exchanged
- 15 Be aware of the PW protocol stack, PW Control Word and O&M





- 16 Explain the difference between Ethernet, ATM and TDM (SAToP) carried over PWs
- 17 Describe how bridging works in VPLS, how loops are prevented and understand H-VPLS

Target audience

The target audience for this course is:
Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593
OSPF <u>or</u> IS-IS Overview & Fundamentals	LZU 108 8536 <u>or</u> LZU 108 8534
MPLS Overview & Fundamentals	LZU 108 8517

Duration and class size

The length of the course is appr. 1.5 hour.

Learning situation

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Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	What is a VPN Service? Business drivers for VPN's VPN Requirements VPN Models MPLS L3VPN MPLS L2VPN Benefits of MPLS VPN's Why L2VPN What is MPLS L2VPN Different L2VPN Services Virtual Private Wire Service Virtual Private LAN Service	



MPLS Overview & Fundamentals



LZU 108 8517 R1A

Description

This course contains of two modules.

The first module, the Overview, gives an introduction into MPLS (Multiprotocol Label Switching). It explains the need for MPLS in a world evolving to "all-IP". It describes how networks are evolving, based on MPLS, what MPLS offers and on a very high level how MPLS works.

The second module, the Fundamentals, web based learning module. This module describes what MPLS is, why we use it and how it works. It describes the different roles and functions of all components that make up MPLS. It also describes in detail the label switching and distribution process and how these can be used to create VPNs (Virtual Private Network)."

Both modules end with a Knowledge Assessment

Learning objectives

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

- 1 Understand the importance of MPLS (Multiprotocol Label Switching) for next generation telecommunication networks.
- 2 Understand the basics of MPLS (Multiprotocol Label Switching).
- 3 Know what is Multi-Protocol Label Switching (MPLS) is
- 4 Understand why operators need to use MPLS
- 5 Describe how MPLS works
- 6 Compare MPLS to the OSI (Open Systems Interconnection) model
- 7 Understand the different roles that a router can have in an MPLS backbone (LER (Label Edge Router), LSR (Label Switch Router) etc.)
- 8 Explain the MPLS header and what each field means
- 9 Know the typical deployment scenarios for MPLS and how they are created – LSPs (Label Switched Path), FEC's (Forwarding Equivalence Class), label binding etc.
- 10 Describe the different label distribution and control modes
- 11 Explain how LDP (Label Switched Path) works, the message setup, LDP (Label Distribution Protocol) ID etc.





12 Understand how MPLS VPN's work and are setup

Target audience

The target audience for this course is:
Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593
OSPF <u>or</u> IS-IS Overview & Fundamentals	LZU 108 8536 <u>or</u> LZU 108 8534

Duration and class size

The length of the course is appr. 1.5 hour.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	MPLS Concepts Why MPLS What is MPLS MPLS Functions and Roles Label Switching and Distribution MPLS Virtual Private Networks	

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OSPF Overview & Fundamentals



LZU 108 8536 R1A

Description

This course gives a high-level overview of the IP Routing protocol called Open Shortest Path First (OSPF).

It explains the role of this routing protocol in an IP Network.

This course also presents the main concepts behind the IP Routing protocol called Open Shortest Path First (OSPF).

Learning objectives

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

- 1 Understand the role of OSPF(Open Shortest Path First) in IP networks
- 2 Understand the main concepts of OSPF

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

IP Overview & Fundamentals	LZU 108 8538
IP Routing Overview & Fundamentals	LZU 108 8593

Duration and class size

The length of the course is appr. 1 hour.

Learning situation

This is a self-paced web based course



**Time schedule**

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

Day	Topics in the course	Estimated Time (hours)
1	OSPF Concept Link State Database – Building common network view – Creating network topology – Topology of a broadcast network – Calculating best paths LSA Flooding Introduction to concept of area	Self-paced



OTN Fundamentals



LZU 108 9286 R1A

Description

This course will cover the following topics:

- OTN and G.709 Purposes
- OTN Layers
- G.709 Digital Wrapper Frame
- OPUk / ODUk / OTUk structures and overheads
- OCH Definition
- Not Associated Overhead
- Maintenance Signal

Learning objectives

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

- 1 Describe what OTN is and which are the main characteristics.
- 2 Understand how OTN works and the relevant structure

Target audience

The target audience for this course is:

Fundamentals

Prerequisites

Successful completion of the following courses:

There are no prerequisites for this course

Duration and class size

The length of the course is 1 hour.

Learning situation

This is a self paced web based course





Time schedule

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

Day	Topics in the course	Estimated Time (hours)
	Introduction to the course	
	OTN Layer Structure	
	Optical Transport Module	
	OTN Evolution	
	Frame Structure	
	OTM-n.m Structure	
	OTN Maintenance Signals	
	Summary	

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WDM Overview and Fundamentals



LZU 108 8784 R1A

Description

This course consists of two parts.

The first part will provide basic introduction to WDM Fiber Optic Transport technology and relevant components:

- The Photonic Layer, properly named WDM - Wavelength Division Multiplexing
- The Digital Layer, named OTN – Optical Transport Network frame structure
- The Control Plane, with a double name, ASON - Automatic Switched Optical Network and WSON - Wavelength Switched Optical Network

The second part covers the following topics:

- Propagation in Optical Fiber
- Attenuation in Optical Fiber
- Linear Phenomena: CD and PMD
- Non Linear Phenomena: SPM, XPM and FWM
- Stimulated Scattering
- DWDM Amplifier Technology

Learning objectives

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

- 1 Describe what WDM is and which benefits bring into a transport network
- 2 Understand what OTN is and which benefits bring to WDM
- 3 Understand which additional features the introduction of an ASON/SWON control plane bring to the WDM layer
- 4 Describe in detail WDM transmission technology
- 5 Understand transmission impairment in optical fibers
- 6 Understand the main concepts related to the feasibility of a WDM link
- 7

Target audience

The target audience for this course is:



ERICSSON



Fundamentals

Prerequisites

Successful completion of the following courses:

There are no prerequisites for this course

Duration and class size

The length of the course is 1.25 hours.

Learning situation

This is a self-paced web based course

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	WDM Overview OTN Overview ASON/WSON Overview WDM Typical deployments WDM Trends and drivers Summary Knowledge Assessment	

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SPO 1400 R16 Basic Commissioning



LZU1082443 R1A

Description

Operating the first commissioning and the configuration of the Ericsson SPO 1400 equipment can be a complex and resource-consuming task, if your personnel don't have the appropriate tools and knowledge

This course is designed for people who have to perform Commissioning and Basic Operation of the Ericsson SPO 1400 equipment in the network. The course contents will provide the full information about the equipment features and system architecture. The basic procedures for equipment start up and configuration will be explained.

Learning objectives

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

- 1 Use the SPO 1400 Local Terminal interface
 - 1.1 Operate the First Provisioning
 - 1.2 Install the LCT and connect it to the equipment
 - 1.3 Navigate the LCT working areas
- 2 Operate the initial system set-up
 - 2.1 Configure SPO 1400 using the Commissioning Wizard
 - 2.2 Configure the unit's parameters
 - 2.3 Configure the ports' parameters
 - 2.4 Configure synchronization
 - 2.5 Configure and analyze the communication parameters

Target audience

The target audience for this course is:

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





Prerequisites

Successful completion of the following courses:

OMS 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

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, which are accessed remotely.

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	First Provisioning	1.0 hours
	Initial system Set-up	5.0 hours

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SPO 1400 R16 Circuit Emulation and Synchronization Operations



LZU1082445 R1A

Description

Ericsson SPO 1400 could be used for replacing existing transport networks based on legacy PDH-SDH technology thus introducing a full packet transport. In this scenario it could be required to maintain a certain amount of PDH services. In this case you will need to use a Circuit Emulation Service.

This course is designed for people who have to configure and maintain CES on SPO 1400 and will provide the full information about CES configuration.

Learning objectives

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

- 1 Provision Circuit Emulation Services
 - 1.1 Describe Circuit Emulation Services
 - 1.2 Operate provisioning of CES services.
 - 1.3 Perform activation of ATM over Packet
- 2 Configure the Synchronization
 - 2.1 Configure synchronization using Synchronous Ethernet
 - 2.2 Describe the Synchronization modes for PTP.

Target audience

The target audience for this course is:

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

Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.





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, which are accessed remotely

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Circuit Emulation Services	4.0 hours
	Synchronization	2.0 hours



SPO 1400 R16 Ethernet Operations



LZU1082446 R1A

Description

Operating the configuration of the Ericsson SPO 1400 Ethernet services can be a complex and resource-consuming task, if your personnel don't have the appropriate tools and knowledge.

This course is designed for people who have to perform Ethernet Operation of the Ericsson SPO 1400 equipment in the network.

The service configurations procedures will be explained.

Learning objectives

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

- 1 Describe Ethernet Services
 - 1.1 Analyze Ethernet Services components
- 2 Configure Ethernet Bridge traffic and protection schemes
 - 2.1 Describe Ethernet Over SDH
 - 2.2 Operate provisioning of E-LINE services
 - 2.3 Describe Customer Bridge and Provider Bridge
 - 2.4 Set-up and manage the protections mechanisms: RSTP/MSTP and LAG
 - 2.5 Operate provisioning of E-LAN services
 - 2.6 Operate the provisioning of Ethernet Ring Protection.
- 3 Provision Connectivity Fault Management
 - 3.1 Perform activation of Connectivity Fault Management.
 - 3.2 ERP and CFM
 - 3.3 Analyze results from Y.1731 performances

Target audience

The target audience for this course is:

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





Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

Duration and class size

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

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Ethernet Services description	1.0 hour
	Services and protection schemes provisioning	5.0 hours
2	Services and protection schemes provisioning	4.0 hours
	Connectivity Fault Management	2.0 hours

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SPO 1400 R16 Maintenance and Advanced Troubleshooting



LZU1082447 R1A

Description

Maintenance of equipment could be a complex and resource-consuming task if your personnel do not have the appropriate skills and knowledge. This course will provide your operators with full information on how to maintain the SPO1400 in the most efficient way. Also, the course contents have been enriched in order to include important troubleshooting tips whose knowledge is crucial for the correct equipment troubleshooting and trouble report.

Learning objectives

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

- 1 Use the SPO1400 Local Terminal interface
 - 1.1 Install the LCT and connect it to the equipment
 - 1.2 Navigate the LCT working areas
- 2 Manage fault reporting
 - 2.1 Manage the alarm attributes and OSPF traps
 - 2.2 Recognize the fault condition and find the alarm cause
- 3 Manage the equipment database and software
 - 3.1 Perform the backup and restore of the equipment database
 - 3.2 Describe the software download principles
 - 3.3 Perform the Software Licenses Update
- 4 Operate main maintenance procedures
 - 4.1 Use common tools for troubleshooting
 - 4.2 Perform the card replacement
 - 4.3 Identify and manage some emergency conditions
- 5 Opening a Customer Service Request (CSR)
 - 5.1 Practice the collection of the mandatory data required for the CSR
- 6 SPO1400 troubleshooting guidelines
 - 6.1 Perform common specific fault recovery
 - 6.2 Exercises on the troubleshooting guidelines





Target audience

The target audience for this course is:

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

Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

Duration and class size

The length of the course is 2 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, which are accessed remotely.

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Starting SPO 1400 Local Terminal interface	1
	Management of the fault reporting	1
	Management of the equipment database and software	2
	Operate main maintenance procedures	2
2	Opening a Customer Service Request (CSR)	3
	SPO1400 troubleshooting guidelines	3

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SPO 1400 R16 PDH/SDH Operations



LZU1082450 R1A

Description

Operating the configuration of the Ericsson SPO 1400 PDH-SDH services can be a complex and resource-consuming task, if your personnel don't have the appropriate tools and knowledge.

This course is designed for people who have to perform PDH and SDH Operation of the Ericsson SPO 1400 equipment in the network.

The course contents will provide the full information about the equipment features and system architecture. The basic service configurations procedures will be explained.

Learning objectives

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

- 1 Use the SPO 1400 Local Terminal interface
 - 1.1 Install the LCT and connect it to the equipment
 - 1.2 Navigate the LCT working areas
- 2 Configure TDM traffic
 - 2.1 Set-up and manage TDM Expansion Shelf (TES).
 - 2.2 Operate the provisioning of the traffic services
- 3 Configure protection schemes
 - 3.1 Set-up and manage the protections mechanisms: MSP, SNCP and MS-SPRING
- 4 Analyze the performance data
 - 4.1 Set-up the performance data collection
 - 4.2 Analyze the performance data and the optical measurement

Target audience

The target audience for this course is:

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





Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

Duration and class size

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

Learning situation

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

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Using the LCT	0.5 hours
	Services provisioning	2.5 hours
	Protection schemes	2.0 hours
	Configuration of the performance data collection	1.0 hours



Fronthaul 6080 R17 Operation and Maintenance



LZU1082529 R1A

Description

Operating the first commissioning and the configuration of FRONTHAUL 6080 equipment can be a complex and resource-consuming task, if your personnel don't have the appropriate tools and knowledge

This course is designed for people who have to perform Operations and Maintenance of the FRONTHAUL6080 equipment in the network.

The course contents will provide the full information about the equipment features and system architecture. The basic procedures for equipment start up and configuration of the main maintenance procedures explained.

The course material does not include step-by-step exercises that will be included in a following revision.

Learning objectives

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

- 1 Define the WDM
 - 1.1 Name the main WDM technologies
 - 1.2 Describe the DWDM Network components
- 2 Describe the FRONTHAUL 6080 equipment Active Solution
 - 2.1 Identify the FRONTHAUL 6080 Dual Fiber Active Solution applications
 - 2.2 Name the FRONTHAUL 6080 Active Units
 - 2.3 Describe the FRONTHAUL 6080 Active Solution Composition
 - 2.4 Recognize the FRONTHAUL 6080 management
- 3 Describe the FRONTHAUL 6080 equipment Passive Solution
 - 3.1 Underline the FRONTHAUL 6080 Single Fiber Passive Solution applications
 - 3.2 Name the FRONTHAUL 6080 Passive Units
 - 3.3 Identify the FRONTHAUL 6080 Single Fiber Active Solution applications
- 4 Use the FRONTHAUL 6080 Local Craft Terminal (LCT) interface
 - 4.1 Assess to the equipment
 - 4.2 Navigate the LCT working areas
 - 4.3 CLI Introduction
- 5 Operate the initial system set-up





- 5.1 Name commissioning steps
- 5.2 Provision the WDM Services
- 6 Analyze the alarms and performance data
 - 6.1 Describe the alarms recognition
 - 6.2 Analyze the performance data and the optical measurement
- 7 Perform the Maintenance Procedures
 - 7.1 Name the main maintenance procedures
 - 7.2 Describe the data collection procedures

Target audience

The target audience for this course is:

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

Prerequisites

Successful completion of the following courses:

The participants should be familiar with CWDM and DWDM principles.

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 technical environment using equipment and tools which can be optionally accessed from remote. This course can be conducted at the Customer premises.



Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Understand the WDM	2
	Describe the FRONTHAUL 6080 equipment	4
2	Starting the FRONTHAUL 6080 Local Terminal interface	1
	Operate the initial system set-up (part 1)	5
3	Operate the initial system set-up (part 2)	3
	Analyze the alarms and performance data	1
	Perform the Maintenance Procedures	2



SPO 1400 Quality of Service



LZU1082573 R1A

Description

Maintenance of packet based services could be a complex and resource-consuming task if your personnel do not have the appropriate skills and knowledge. This course will provide to your operators the full information on how to maintain the SPO1400 in the most efficient way.

Learning objectives

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

- 1 Describe QoS Basics
 - 1.1 List various traffic requirements
 - 1.2 Name traffic management mechanisms
 - 1.3 Identify the different classes of service
- 2 Identify Ethernet Services
 - 2.1 Name Ethernet Services Components
- 3 Manage QoS on SPO 1400
 - 3.1 Describe SPO 1400 packet architecture
 - 3.2 Operate QoS settings on SPO 1400
 - 3.3 Describe QoS settings for Ethernet Services
 - 3.4 Set-up and maintain Ethernet Services on CB and PB
 - 3.5 Operate QoS settings on MPLS-TP
- 4 Analyze traffic performances
 - 4.1 Set-up Y.1731 performances collection
 - 4.2 Analyze Y.1731 results

Target audience

The target audience for this course is:

Network Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians.





Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

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 technical environment using equipment and tools which can be optionally accessed remotely. This course can be conducted at the Customer premises.

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Quality of Service basics	3.0
	Ethernet Services Components	1.0
	SPO 1400 packet architecture	2.0
2	SPO 1400 packet architecture	6.0
3	SPO 1400 packet architecture	3.0
	Traffic performances	3.0



SPO 1400 R17 MPLS-TP Operations



LZU1082530 R1A

Description

Operating the configuration of the Ericsson SPO 1400 Ethernet services can be a complex and resource-consuming task, if your personnel don't have the appropriate tools and knowledge.

This course is designed for people who have to perform Ethernet Operation of the Ericsson SPO 1400 equipment in the network.

The service configurations procedures will be explained.

Learning objectives

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

- 1 Describe Ethernet Services
 - 1.1 Analyze Ethernet Services components
- 2 Configure MPLS-TP transport
 - 2.1 Set-up LSP and tunnels
 - 2.2 Operate tunnels protection
- 3 Provision Ethernet Services on MPLS-TP
 - 3.1 Perform activation of VPLS,VPWS and E-TREE
 - 3.2 Analyze results from Y.1731 performances
- 4 Operate advanced MPLS-TP protections
 - 4.1 Describe Multi Segment PW and PW protection
 - 4.2 Set-up and operate DRNI
 - 4.3 Operate H-VPLS
 - 4.4 Demonstrate the MPLS-TP Ring

Target audience

The target audience for this course is:

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





Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH principles.

Duration and class size

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

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in technical environment using equipment and tools which can be optionally accessed remotely. This course can be conducted at the Customer premises.

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Ethernet Services description	1.0 hours
	Configure MPLS-TP transport	2.0 hours
	Services provisioning	3.0 hours
2	Services provisioning	3.0 hours
	Protection Schemes	3.0 hours



SPO 1400 R17 OTN/WDM Commissioning and Operations



LZU1082531 R1A

Description

The operations on SPO 1400 as part of the DWDM network is a complex task that requires appropriate knowledge and skills.

With the aid of this training, your personnel will get to the appropriate knowledge level for performing the operations on the Ericsson SPO 1400 equipment in the OTN network. The course contents will provide the full information about the equipment OTN features and system architecture. The basic procedures DWDM traffic management will be also covered.

Learning objectives

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

- 1 Discuss the SPO1400 DWDM capabilities
 - 1.1 Describe the Transponder and Muxponder cards
 - 1.2 Configure the ODU multiplexing
 - 1.3 Demonstrate the ODU switching
 - 1.4 Discuss OTN protections
 - 1.5 Describe the Photonic Multi-shelf Architecture
- 2 Configure the Photonic Attached Unit (PAU)
 - 2.1 Explain the PAU composition and configuration
 - 2.2 Configure the DWDM traffic using the PAU
 - 2.3 Manage the Optical Line Amplifier SPO 1401
 - 2.4 Describe the RAMAN amplifier

Target audience

The target audience for this course is:

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





Prerequisites

Successful completion of the following courses:

SPO 1400 Overview WBL courses (or have equivalent knowledge)

SPO 1400 Fundamentals WBL courses (or have equivalent knowledge)

The participants should be familiar with the Ethernet, MPLS and SDH, WDM and OTN principles.

Duration and class size

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

Learning situation

This course is based on theoretical and practical instructor-led lessons given in both classroom and in technical environment using equipment and tools which can be optionally accessed remotely. This course can be conducted at the Customer premises.

Time schedule

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

Day	Topics in the course	Estimated Time (hours)
1	Discuss on SPO1400 DWDM Capabilities	6
2	Configure the Photonic Attached Unit (PAU)	6