



# Ethernet DSL Access 1200 (EDA) 4.1 Training Programs

## Catalog of Course Descriptions















# Catalog of Course Descriptions

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## Introduction

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

**Service delivery is supported using various delivery methods including:**

Icon	Delivery Method
	Instructor Led Training (ILT)
	Seminar (SEM)
	Workshop (WS)
	Virtual Classroom Training (VCT)
	Web Based Learning (WBL)
	Short Article (SA)
	Streaming Video (SV)
	CD-ROM (CD)
	Structured Knowledge Transfer (SKT)
<b>Delivery Enablers</b>	
	Remote Training Lab (RTL)
	Web Portal (WP)
<b>Ericsson Education E-Learning</b>	
	EEOnline @ <a href="http://learning.ericsson.net/eeonline/">http://learning.ericsson.net/eeonline/</a>

## Access Networks, An Overview



LZU 108 5944 R2A

### Description

When you complete this course you will be able to describe the basic concepts and technologies in both fixed and mobile access networks. These concepts are all presented in such a way to give you a solid foundation to build upon.

### Learning objectives

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

- 1 Describe fixed network connections in access networks as described in Customer Product Information documents.
  - 1.1 Outline basic concepts such as bandwidth and technologies in access networks
  - 1.2 Describe access based on telephone networks (analogue and digital).
  - 1.3 Outline other access network technologies, such as fiber optics and microwave.
- 2 Describe the basic concepts of mobile access for GSM, GPRS and UMTS.
  - 2.1 Explain GSM architecture and outline how traffic flows in GSM.
  - 2.2 Explain GPRS architecture and outline traffic flow in a GPRS network.
  - 2.3 Explain UMTS architecture and outline traffic flow in a UMTS network.
  - 2.4 Describe Mobile IP

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers.

### Prerequisites

The participants should be familiar with IP Network Applications WBL, LZU 108 5943.

### Duration and class size

The length of the course is 2 hours 30 minutes.



### 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	<ul style="list-style-type: none"><li>• Fixed Network Connection: Access Networks</li><li>• Connecting While Traveling: Mobile Access</li></ul>	1 hour 1 hour 30 mins

## Core Networks, An Overview



LZU 108 5945 R2A

### Description

Upon completion of this course, you will have acquired the knowledge to describe the technologies in the core networks, core network architecture and network operation and maintenance.

### Learning objectives

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

- 1 Describe the technologies in the core network as found in the system release documentation
  - 1.1 Explain how a physical network is built
  - 1.2 Outline different types of multiplexing (TDM and WDM)
  - 1.3 Describe transmission technologies such as SDH and SONET
  - 1.4 Describe optical ring architecture and the basics of ATM and MPLS
- 2 Define core network architectures
  - 2.1 Understand traffic trends and outline multi service backbone requirements
  - 2.2 Explain resource allocation and quality of service
  - 2.3 Outline performance optimization
  - 2.4 Define IPSec and VPN technology
- 3 Outline the main principles of network operation and maintenance
  - 3.1 Outline the steps involved in network operation
  - 3.2 Explain network traffic and outline some network traffic situations
  - 3.3 Explain monitoring using SNMP and PING
  - 3.4 Define steps and routines for error handling

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers.

### Prerequisites

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The participants should be familiar with IP Network Applications WBL, LZU 108 5943.

**Duration and class size**

The length of the course is 3 hours.

**Learning situation**

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

**Time schedule**

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

<b>Day</b>	<b>Topics in the course</b>	<b>Estimated time</b>
1	<ul style="list-style-type: none"><li>• Technologies in the Core Network</li><li>• Core Network Architecture</li><li>• Network Operation and Maintenance</li></ul>	<p>1 hour</p> <p>1 hour</p> <p>1 hour</p>

## EDA 1200 4.1 Installation and Network Configuration



LZU 108 7017 R1A

### Description

This course provides the participants with skills necessary to create access networks and to install EDA 1200 access nodes comprising controllers, switches, ADSL and VDSL2 nodes and FE-E1/T1 converters. Guidance for installing fiber/cat5 nodes is also given.

The EMP functionalities in the ECN330 and ECN430 and the CLI are used for installation, line testing and end-user service provisioning.

The PEM management system is used for creating access networks and for configuring network elements.

Furthermore, the course enables the participants to perform security management, fault management, performance management and system maintenance tasks.

### Learning objectives

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

- 4 Install network elements
  - 4.1 Install network elements comprising controllers, switches, ADSL and VDSL2 nodes and FE-E1/T1 converters
  - 4.2 Verify installation using EMP functionalities and CLI
- 5 Create the access network
  - 5.1 Create regions and line terminations
  - 5.2 Create domain subnet servers
  - 5.3 Create IP networks and domain subnets
  - 5.4 Discover and create access nodes
- 6 Configure network elements
  - 6.1 Configure properties of network elements
  - 6.2 Verify configuration and status of network elements
- 7 Perform security management
  - 7.1 Create PEM user accounts
- 8 Perform fault and performance management
  - 8.1 Handle alarms using the PEM Fault Manager
  - 8.2 Monitor node performance
- 9 Perform system maintenance
  - 9.1 Perform maintenance tasks
  - 9.2 Upgrade software in network elements



- 9.3 Backup the PEM database, the management server, and the domain server
- 9.4 Configure SNMPv3

### Target audience

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

### Prerequisites

Successful completion of the following courses:

1. IP Networking, LZU 102 397, or equivalent qualifications
2. EDA 1200 Overview, LZU 108 7016

### Duration and class size

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

### Learning situation

The course is based on theoretical and practical instructor-led lessons given in both a 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	Short description of the topics in the course	Estimated time
1	Installing network elements	6 hours
2	Creating the access network	3 hours
	Configuring network elements	3 hours
3	Security management	1 hour
	Fault and performance management	2 hours
	System maintenance	3 hours

## EDA 1200 4.1 Overview



LZU 108 7016 R1A

### Description

This course provides the participants with an overview of the EDA 1200 ADSL, VDSL2 and fiber/cat5 solution, its components and it describes how service provisioning is supported. The course also describes line bonding, line testing, PSD shaping, VDSL2 profiling, quality of service, and security measures.

Furthermore, the course gives an introduction to the built-in EDA management proxy (EMP) functionalities in the ECN330 and ECN430 controllers; functionalities that make it possible to install, test and provision a node without contact to a management system. An introduction is also given to the HP OpenView based Public Ethernet Manager (PEM) running on Windows and Solaris platforms.

### Learning objectives

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

- 10 Describe fundamental principles of the EDA 1200 solution
  - 10.1 Describe ADSL, VDSL2 and fiber/cat5 network solutions
  - 10.2 Describe the function and features of ADSL, VDSL2 and fiber/cat5 solutions
  - 10.3 Explain data, video and telephony implementation scenarios
  
- 11 Describe the EDA 1200 components
  - 11.1 List the network components
  - 11.2 Describe the main function of each network component
  
- 12 Describe quality of service and security measures
  - 12.1 Describe ATM and packet based QoS
  - 12.2 Describe access methods
  - 12.3 Describe end-user and network security measures
  
- 13 Describe the PEM management system
  - 13.1 Describe the main characteristics of the management system
  - 13.2 Describe the applications in the management system
  - 13.3 Describe the local craft tools and line testing methods

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, Customer Care Administrators.



### **Prerequisites**

Successful completion of the following course:  
IP Networking, LZU 102 397, or equivalent qualifications.

### **Duration and class size**

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

### **Learning situation**

The 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.

<b>Day</b>	<b>Short description of the topics in the course</b>	<b>Estimated time</b>
1	System overview	2 hours
	Components	1 hour
	Services and security	2 hours
	Management overview	1 hour

## EDA 1200 4.1 Service and End-user Configuration



LZU 108 7018 R1A

### Description

This course provides the participants with skills necessary to create line configurations, alarm configurations, ADSL and VDSL2 service configurations, and end-user profiles using the PEM management system.

### Learning objectives

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

- 14 Configure line and alarm parameters
  - 14.1 Describe key ADSL and VDSL2 configuration parameters
  - 14.2 Create line configurations
  - 14.3 Create alarm configurations
  
- 15 Create service and traffic configurations
  - 15.1 Describe key ATM and PTM configuration parameters
  - 15.2 Create configurations for ATM and packet based QoS
  - 15.3 Create traffic configurations
  
- 16 Create profiles and end-users
  - 16.1 Create and modify end-user profiles
  - 16.2 Create, modify, and delete end-users
  - 16.3 Perform bulk configurations
  - 16.4 Inspect subscriber lines

### Target audience

The target audience for this course is: System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, Customer Care Administrators.

### Prerequisites

Successful completion of the following courses:

- 17 IP Networking, LZU 102 397, or equivalent qualifications
- 18 EDA 1200 Overview, LZU 108 7016
- 19 EDA 1200 Installation and Network Configuration, LZU 108 7017

### Duration and class size



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

### **Learning situation**

The course is based on theoretical and practical instructor-led lessons given in both a 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.

<b>Day</b>	<b>Short description of the topics in the course</b>	<b>Estimated time</b>
1	Line and alarm configurations	2 hours
	Service and traffic configurations	2 hours
	End-user configurations	2 hours

## EDA 1200 Troubleshooting



LZU 108 7069 R1A

### Description

This course provides the participants with the knowledge and skills needed to troubleshoot an EDA system comprising PEM, ECN330 and EDN312 or a system comprising PEM, ECN330, ESN212, EDN612 and an optional ESN410. To systematically trace faults, the course focuses on defining whether faults relate to PEM, the access network or customer equipment. Services like Internet surfing, IPTV and IP telephony will be configured for the network used during the course.

Ethereal as well as log and property files will be used to trace, analyze and isolate faults.

Furthermore, the course also enables the participants to analyze alarms and to take appropriate actions.

This course is valid for EDA 1200 release 2.2 or newer.

### Learning objectives

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

20 Describe EDA signaling

20.1 Describe the signaling between PEM, ECN330 and IP DSLAM

21 Troubleshoot node hardware related faults

21.1 Analyze alarms and logs using web interface, CLI and PEM

21.2 Check hardware revisions and inventory using web interface and CLI

22 Troubleshoot node software related faults

22.1 Analyze alarms and logs using web interface, CLI and PEM

22.2 Check boot and application software using web interface, CLI and PEM

22.3 Use the root account

22.4 Tracing SNMP packets using private MIBS

23 Troubleshoot PEM related faults

23.1 Identify and analyze alarms

23.2 Analyze log and property files

23.3 Check and remove locks

23.4 Check PEM client, server and database versions

23.5 Administrate system resources

23.6 Create trouble reports

24 Troubleshoot end-user traffic

24.1 Analyze line parameters using customer care

24.2 Use tunneling and mirroring

## 24.3 Trace and analyze voice, video, DHCP and PPP services

### Target audience

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

### Prerequisites

Successful completion of the following courses, or equivalent qualifications:

3. EDA 1200 Overview, LZU 108 6789
4. EDA 1200 Installation and Network Configuration, LZU 108 6790
5. EDA 1200 Service and End-user Configuration, LZU 108 6791

### Duration and class size

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

### Learning situation

The course is based on theoretical instructor-led lessons given in both a 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	EDA signaling	1 hour
	Troubleshoot node hardware related faults	2 hours
	Troubleshoot node software related faults	3 hours
2	Troubleshoot PEM related faults	3 hours
	Troubleshoot end-user traffic	3 hours

## EFN324 Installation and Configuration



LZU 108 7071 R1A

### Description

This course describes the main system characteristics of an EFN324 fiber/cat5 access node, gives a detailed description of QoS handling including traffic classification, scheduling, and policing mechanism.

This also course provides the participants with the knowledge and skills required to install and configure an EFN324 access node using CLI and PEM. Service provisioning will be done using CLI and PEM.

Furthermore, the course enables the participants to read and interpret log files, read statistical parameters, use debugging and diagnostic functions.

Approximately 50% of the course is allocated to hands-on exercises.

### Learning objectives

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

- 25 Describe EFN324 based solutions
  - 25.1 Describe typical EFN324 based access nodes
  - 25.2 Describe services supported by the EFN324
  - 25.3 Describe the main function of the EFN324
  - 25.4 Describe network functions
  
- 26 Describe EFN324 characteristics
  - 26.1 Describe the switching functions
  - 26.2 Describe the security functions
  - 26.3 Describe the system function
  
- 27 Explain QoS mechanisms
  - 27.1 Explain traffic classification
  - 27.2 Explain scheduling
  - 27.3 Explain policing
  
- 28 Install the EFN324
  - 28.1 Perform initial configuration of the EFN324 using CLI
  - 28.2 Verify the installation
  - 28.3 Create services using CLI
  - 28.4 Back up and restore configurations
  
- 29 Create the access network
  - 29.1 Create regions and line terminations
  - 29.2 Create domain subnet servers
  - 29.3 Create IP networks
  
- 30 Create services and end-users in PEM

- 30.1 Create and modify service configurations
- 30.2 Create and modify end-user profiles
- 30.3 Create, modify, and delete end-users
- 30.4 Read customer care information
  
- 31 Perform debugging and diagnostics
  - 31.1 Describe packet logger and trace logger applications
  - 31.2 Use the packet logger

### Target audience

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

### Prerequisites

The participants should be familiar with basic EDA 1200 and PEM configuration and operation.

### 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 a 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	EFN324 solutions	1 hour
	EFN324 characteristics	1 hour
	QoS mechanisms	1 hour
	Installing the EFN324	3 hours
2	Creating the access network	1 hour
	Creating services and end-users in PEM	3 hours
	Debugging and diagnostics	2 hours

## IP Advanced



LZU 108 6748 R1A

### Description

This course will give the students an insight and understanding of QoS, security issues and management of IP networks. The students will learn the operation of QoS supporting IP Protocols, VoIP protocols, Security topics such as authentication, confidentiality, and integrity and Simple Network Management Protocol. The hands-on exercises are used to facilitate the understanding of theory sessions.

### Learning objectives

On completion of each module the participants will be able to:

#### 32 Quality of Service (QoS)

- 32.1 Explain QoS Fundamentals and QoS related Protocols
- 32.2 Analyze the enhancement of the IP networks to support transmission of Real Time data
- 32.3 Describe QoS Basic Concepts
- 32.4 Describe QoS Architectures
- 32.5 Describe QoS Mechanisms
- 32.6 Explain Resource Reservation Protocol (RSVP) – RFC 2205
- 32.7 Explain Multi Protocol Label Switching (MPLS) – RFC 3031
- 32.8 Perform practical exercises covering Class Based Marking (CBM) using IP Precedence, DSCP and MPLS

#### 33 Voice over IP (VoIP)

- 33.1 Comment some VoIP Protocols: H.323, Media Gateway Control Protocol (MGCP) – RFC 2705 and H.248 (MEGACO)
- 33.2 Explain Session Initiation Protocol (SIP) – RFC 3261
- 33.3 Explain Real-Time Transport Protocol (RTP) and RTP Control Protocol (RTCP) – RFC 3550 and RFC 3611
- 33.4 Perform practical exercises covering SIP messages

#### 34 IP Security (IP Sec)

- 34.1 Analyze the existing security threats types
- 34.2 Explain Access control lists (ACL)
- 34.3 Explain the purpose and use of Firewalls
- 34.4 Explain Encryption techniques
- 34.5 Identify different Security Services
- 34.6 Explain how Virtual Private Networks (VPN) operate
- 34.7 Explain IP Security (IPSec) – RFC 4301
- 34.8 Explain Authentication Header (AH) – RFC 4302
- 34.9 Explain Encapsulating Security Payload (ESP) – RFC 4303

- 34.10 Explain Internet Key Exchange (IKE) – RFC 2409 v1/RFC 4306 v2
- 34.11 Show some Transport Layer Security Protocols (SSL and TLS) – RFC 2246v1/RFC 4346 v1.1
- 34.12 Perform practical exercises covering the configuration of an IPsec VPN tunnel (Phase I and Phase II negotiation)

### **35 IP Network Management**

- 35.1 Explain the five management areas defined by ISO
- 35.2 Describe the architecture of the SNMP management
- 35.3 Describe the current status of different SNMP versions
- 35.4 Explain Manager-Agent communication and configuration
- 35.5 Describe the relation between ASN.1 and SMI
- 35.6 Explain the relationship between SMI and MIBs
- 35.7 Describe the standard MIB-II groups
- 35.8 Explain the development of additional MIBs
- 35.9 Describe the functionality provided by the RMON I and II MIBs
- 35.10 Explain the operations supported by SNMP
- 35.11 Identify SNMP messages and understand message content
- 35.12 Describe the functionality provided by SNMP v3
- 35.13 Perform practical exercises covering analysis of SNMP messages

### **Target audience**

The target audience for this course is the staff involved in IP networking and require more knowledge on IP networks to guarantee quality of service, security, and management of real-time traffic.

### **Prerequisites**

IP Networking or equivalent knowledge.

### **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 or simulation 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	Short description of the topics in the course	Estimated time
1	• Explain QoS Fundamentals and QoS related Protocols	0.3
	• Analyze the enhancement of the IP networks to support transmission of Real Time data	0.2
	• Describe QoS Basic Concepts	0.5
	• Describe QoS Architectures	0.5
	• Describe QoS Mechanisms	0.5
	• Explain Resource Reservation Protocol (RSVP)	1.5
	• Explain Multi Protocol Label Switching (MPLS)	1.0
	• Explain Label Distribution Systems (LDP, RSVP-TE, BGP)	0.5
	• Perform practical exercises covering Class Based Marking (CBM) using IP Precedence, DSCP and MPLS	1.0
2	• Comment some VoIP Protocols: H.323, Media Gateway Control Protocol (MGCP) and H.248 (MEGACO)	1.5
	• Explain Session Initiation Protocol (SIP)	1.5
	• Explain Real-Time Transport Protocol (RTP) and RTP Control Protocol (RTCP)	1.5
	• Perform practical exercises covering SIP messages	1.5
3	• Analyze the existing security threats types	1.0
	• Explain Access control lists (ACL)	1.0
	• Explain the purpose and use of Firewalls	1.0
	• Explain Encryption techniques	1.0
	• Identify different Security Services	1.0
	• Explain how virtual Private Networks (VPN) operate	1.0
4	• Explain IP Security (IPSec)	1.0
	• Explain Authentication Header (AH)	1.0



- Explain Encapsulating Security Payload (ESP) 1.0
- Explain Internet Key Exchange (IKE) 1.0
- Show some Transport Layer Security Protocols (SSL and TLS) 1.0
- Perform practical exercises covering the configuration of an IPSec VPN tunnel (Phase I and Phase II negotiation) 1.0
- 5 • Explain the five management areas defined by ISO 0.2
- Describe the architecture of the SNMP management 0.3
- Describe the current status of different SNMP versions 0.5
- Explain Manager-Agent communication and configuration 0.5
- Describe the relation between ASN.1 and SMI 0.5
- Explain the relationship between SMI and MIBs 0.5
- Describe the standard MIB-II groups 0.5
- Explain the development of additional MIBs 0.5
- Describe the functionality provided by the RMON I and II MIBs 0.5
- Explain the operations supported by SNMP 0.5
- Identify SNMP messages and understand message content 0.5
- Describe the functionality provided by SNMP v3 0.5
- Perform practical exercises covering analysis of SNMP messages 0.5

## IP Network Applications



LZU 108 5943 R2A

### Description

This course is recommended for anyone who needs a basic introduction to IP network applications and TCP/IP data communications.

### Learning objectives

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

- 36 Describe network fundamentals and describe IP network applications
  - 36.1 Explain how Internet applications are addressed in a data packet
  - 36.2 Understand application models (Client/Server and Peer-to-Peer)
  - 36.3 Describe how a Web browser works
  - 36.4 Explain Web architecture and connecting to a Web server
  - 36.5 Explain how to send and receive Internet E-mail and outline the protocols used
  - 36.6 Outline IP telephony architecture
- 37 Explain the TCP/IP data communications architecture
  - 37.1 Describe TCP/IP layered approach to networking
  - 37.2 List the layers in the TCP/IP protocol stack
  - 37.3 List the Internet organizations (ISOC, IETF and ICANN)
  - 37.4 Explain IP addressing and routing and some important fields in an IP packet
  - 37.5 Outline how the Transmission Control Protocol (TCP) works
- 38 Explain the TCP/IP data communications architecture
  - 38.1 Describe TCP/IP layered approach to networking
  - 38.2 List the layers in the TCP/IP protocol stack
  - 38.3 List the Internet organizations (ISOC, IETF and ICANN)
  - 38.4 Explain IP addressing and routing and some important fields in an IP packet
  - 38.5 Outline how the Transmission Control Protocol (TCP) works



### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers, Business Developers.

### Prerequisites

The participants should be familiar with IP Networking and Internetworking WBL, LZU 108 5942.

### Duration and class size

The length of the course is 2.5 hours.

### 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	<ul style="list-style-type: none"><li>Using the Network: IP Network Applications</li></ul>	1 hour 30 mins
	<ul style="list-style-type: none"><li>TCP/IP Data Communications Architecture</li></ul>	1 hour 30 mins

## IP Networking



LZU 102 397 R4A

### Description

This course will give the students an insight and understanding of the TCP / IP protocol stack from the physical layer to the application layer. The students will learn the operation of different protocols and applications within the TCP / IP suite such as DHCP, DNS, NFS, NIS, NTP, HTTP, SMNP, SMTP, Telnet, FTP, TFTP and RTP. Students will learn about IP addresses, both classful and classless (CIDR) and how subnetting / aggregation and VLSM operates. Students will learn about different network devices and will get a detailed understanding of LAN Switching, Routing and Routing protocols. The hands-on exercises and analysers are used to facilitate the understanding of theory sessions.

### Learning objectives

On completion of each module the participants will be able to:

#### 1 List and describe the IP networking including the involved Bodies.

- 38.6 List the functions of the different bodies involved in IP standards / RFCs.
- 38.7 Analyze the OSI reference model and how it relates to the TCP / IP stack.
- 38.8 Explain Ethernet as Physical and Data Link Layer: MAC Address, CSMA/CD principles, Fast Ethernet, Gigabit Ethernet and speed negotiation.
- 38.9 Explain the operation of Hubs, Switches and Routers.
- 38.10 Explain Wireless LANs.
- 38.11 Explain IP Protocol.
- 38.12 Explain IPv4 packet structure, protocol header and features.
- 38.13 Explain VLSM, CIDR, Subnetting, aggregation, NAT and NAPT.
- 38.14 Explain ICMP protocol, ping and traceroute.
- 38.15 Explain IGMP protocol.
- 38.16 Perform exercises configuring IPv4 addresses, and check connectivity.
- 38.17 Demonstrate IPv6 packet structure, protocol header, features.

#### 2 Explain and compare the transport protocols.

Explain TCP, UDP and SCTP protocol structures, headers and functionality.

#### 3 List the applications protocols.

List and explain the operation of different protocols / applications such as DHCP, DNS, NFS, NIS, NTP, HTTP, SMNP, SMTP, Telnet, FTP, TFTP and RTP.

#### 4 Describe IP Switching and Routing Protocols and perform exercises using Netsim Simulator.



Explain and perform exercises about ARP.  
Explain and perform exercises of VLANs.  
Explain the purpose of Spanning Tree Protocol (STP).  
Explain the operation of Static and Dynamic routing protocols.  
Perform Static routing exercises.  
List the differences between Vector Distance and Link State protocols.  
Explain RIP routing protocol.  
Explain OSPF routing protocol.  
Explain BGP routing protocol.  
Explain IS-IS routing protocol.  
Perform routing Protocol exercises.

### **Target audience**

The target audience for this course are personnel who are involved in IP networking or those who require more knowledge on IP addressing, application and routing protocols.

### **Prerequisites**

There are no pre-requisites

### **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 or simulation 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	Short description of the topics in the course	Estimated time
1	<ul style="list-style-type: none"> <li>List the functions of the different Standard Bodies involved in IP Standards / RFCs</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Analyze the OSI Reference Model and how it relates to the TCP / IP stack</li> </ul>	1
	<ul style="list-style-type: none"> <li>Explain Ethernet as Physical and Data Link Layer: MAC Address, CSMA/CD principles, Fast Ethernet, Gigabit Ethernet and speed negotiation</li> </ul>	1,5
	<ul style="list-style-type: none"> <li>Explain the operation of Hubs, Switches and Routers</li> </ul>	2,5
	<ul style="list-style-type: none"> <li>Explain Wireless LANs</li> </ul>	0,5
2	<ul style="list-style-type: none"> <li>Explain IP Protocol</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Explain IPv4 packet structure, protocol header and features</li> </ul>	1
	<ul style="list-style-type: none"> <li>Explain VLSM, CIDR, Subnetting, aggregation, NAT and NAPT</li> </ul>	1
	<ul style="list-style-type: none"> <li>Explain ICMP protocol, ping and traceroute</li> </ul>	1
	<ul style="list-style-type: none"> <li>Explain IGMP protocol</li> </ul>	3
3	<ul style="list-style-type: none"> <li>Perform exercises configuring IPv4 addresses, and check connectivity</li> </ul>	3
	<ul style="list-style-type: none"> <li>Demonstrate IPv6 packet structure, protocol header, features</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Explain TCP, UDP and SCTP protocol structures, headers and functionality</li> </ul>	2
	<ul style="list-style-type: none"> <li>List and explain the operation of different protocols / applications such as DHCP, DNS, NFS, NIS, NTP, HTTP, SNMP, SMTP, Telnet, FTP, TFTP and RTP</li> </ul>	2,5
	<ul style="list-style-type: none"> <li>Explain and perform exercises about ARP</li> </ul>	2
4	<ul style="list-style-type: none"> <li>Explain and perform exercises of VLANs</li> </ul>	3
	<ul style="list-style-type: none"> <li>Explain the purpose of Spanning Tree Protocol (STP)</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Explain the operation of Static and Dynamic routing protocols</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Perform Static routing exercises</li> </ul>	1
	<ul style="list-style-type: none"> <li>List the differences between Vector Distance and Link State protocols</li> </ul>	0,5
5	<ul style="list-style-type: none"> <li>Explain RIP routing protocol</li> </ul>	1
	<ul style="list-style-type: none"> <li>Explain OSPF routing protocol</li> </ul>	1,5
	<ul style="list-style-type: none"> <li>Explain BGP routing protocol</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Explain IS-IS routing protocol</li> </ul>	0,5
	<ul style="list-style-type: none"> <li>Perform routing protocol exercises</li> </ul>	4

## IP Networking and Internetworking



LZU 108 5942 R2A

### Description

If you need to have an understanding of the principles of IP networking and internetworking, then this three hour course will provide you with the information you need. This course covers the basics of IP addresses, internet domains, how IP packets are sent using routers to details on routing protocols and utilities used to get information on the network.

### Learning objectives

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

- 1 Describe the basic concepts of IP networking
  - 1.1 Define virtual address and explain communication between networks
  - 1.2 Outline the difference between IPv4 and IPv6 addressing
  - 1.3 Outline how to configure the hosts in LAN (IP address, subnet mask, default gateway)
  - 1.4 Understand Internet domains and how the Domain Name System works
  - 1.5 Describe how to leave the local network using a Router
- 2 Describe the basic concepts of IP internetworking
  - 2.1 Describe the Internet (transit, regional and ISP networks)
  - 2.2 Understand routing domains and usage of two routing protocols (RIP and OSPF)
  - 2.3 Discover networks using two useful utilities PING and Traceroute

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers, Business Developers.

### Prerequisites

The participants should be familiar with Networking and Ethernet Standards, LZU 108 5941.



### **Duration and class size**

The length of the course is 2.5 hours.

### **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.

<b>Day</b>	<b>Topics in the course</b>	<b>Estimated time</b>
1	<ul style="list-style-type: none"><li>• IP Networking</li></ul>	1 hour 30 mins
	<ul style="list-style-type: none"><li>• IP Internetworking</li></ul>	1 hour 30 mins

## Networking and Ethernet Standards



LZU 108 5941 R2A

### Description

Upon completion of this course, you will be able to explain the main principles of modern LAN and WAN technologies and concepts, from Ethernet to Wireless LAN.

### Learning objectives

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

- 3 Describe Local Area Networks (LAN) and the Ethernet Standard
  - 3.1 Define the building blocks in a LAN
  - 3.2 Outline the different types of Ethernet standard
  - 3.3 Explain data transmission in an Ethernet LAN - Ethernet frame
  - 3.4 Understand Ethernet basics (CSMA/CD)
  - 3.5 Outline the difference between a Hub and a Switch
  - 3.6 Describe how to connect communication devices and design a LAN
- 4 Describe Wireless Local Area Networks (WLAN)
  - 4.1 Describe two basic types of Wireless LAN (Ad Hoc and Infrastructure mode)
  - 4.2 Outline the IEEE 802.11 standard and its applications
  - 4.3 Outline the properties of Home RF
  - 4.4 Understand Bluetooth drivers and communication models

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers, Business Developers.



### Prerequisites

The participants should be familiar with Networking Basics, An Overview, LZU 108 5940.

### Duration and class size

The length of the course is 2.5 hours.

### 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	<ul style="list-style-type: none"><li>Local Area Networks and the Ethernet Standard</li></ul>	1 hour 10 mins
	<ul style="list-style-type: none"><li>Wireless Local Area Networks, WLANs</li></ul>	1 hour 20 mins



## Networking Basics, An Overview



LZU 108 5940 R1B

### Description

When you finish this course, you will have acquired knowledge of the basic networking principles and be able to describe how a PC communicates with other devices and networks.

### Learning objectives

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

- 5 Explain the basics of networking
  - 5.1 Outline the input and output devices of a PC and how they are connected
  - 5.2 Describe the communication parameters necessary to understand connections
  - 5.3 Describe physical and logical network topologies
- 6 Describe how to connect a PC to a datacom network
  - 6.1 Identify and describe communication devices in a LAN (Hub, Switch and Router)
  - 6.2 Understand the different types of cables (UTP,STP and Fiber Optical)
  - 6.3 Explain how to connect computers to a LAN
  - 6.4 Explain the difference between Internet and Intranet
  - 6.5 Outline how to implement a Structured Cabling System (independent cabling system)

### Target audience

The target audience for this course is: Service Planning Engineers, Service Design Engineers, Network Design Engineers, Network Deployment Engineers, Service Deployment Engineers, System Technicians, Service Technicians, System Engineers, Service Engineers, Field Technicians, System Administrators, Application Developers, Business Developers, Customer Care Administrators.

### Prerequisites

There are no prerequisites for this course. The course is open to anyone wishing to gain a basic understanding of modern datacom networking technologies.



### **Duration and class size**

The length of the course is 2.5 hours.

### **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.

<b>Day</b>	<b>Topics in the course</b>	<b>Estimated time</b>
1	<ul style="list-style-type: none"><li>• Network Basics</li></ul>	1 hour
	<ul style="list-style-type: none"><li>• Your PC and the Datacom Network</li></ul>	1 hour