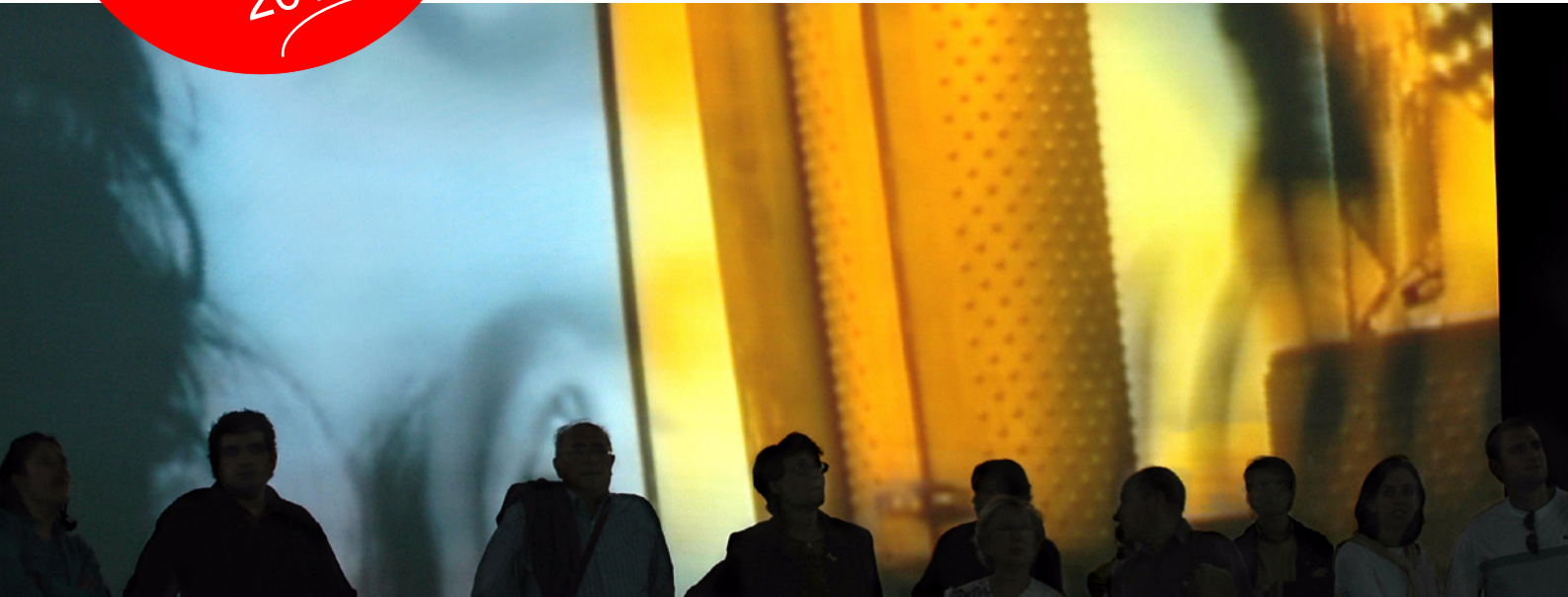




Understanding the Strategy,
Technology, Benefits and
Risks of Telecom

| | | |
|------------|-----------|-----------|
| London | Madrid | Amsterdam |
| Budapest | Ankara | Milano |
| Zagreb | Paris | Rome |
| Barcelona | Singapore | Munich |
| Bratislava | Dubai | Beijing |
| Delhi | Athens | Lisbon |



Albedo Training Portfolio

– a strategic view from industry experts

Enhance your business prospects, learn about new applications and explore emerging markets for next-generation networks.

Albedo training courses are especially valuable for decision-makers, business developers, sales and marketing professionals, field engineers and those involved in the development of new telecom and datacom networks and services.

We will provide a deep technology analysis and a practical approach to the subjects covered, seeking to answer questions such as:

- Why is my company adopting this technology?
- What are its *benefits*?
- What do the changes *mean* for me?
- What *market trends* are there?
- What *challenges* will I face?
- How can I *install* it?
- How can I *test* it?
- How can I *maintain* it?



Joan d'Austria, 112 - Barcelona - 08018
www.telecom.albedo.biz

We are a leading European company in Telecom training. In 15 years of activities we have taught, with great success, more than 1,600 courses to 24,000 professionals in more than 32 countries.

Experience, quality, full dedication and independence are the characteristics of the company. Leadership in the field of ICT training is the result of intense and sustained effort of our professionals to build knowledge of these complex technologies, and to improve their didactic skills. In the near future we will expand our geographic coverage by offering courses in English and hosting training sessions in Brussels, London and Barcelona. Next to our scheduled training, we can also offer customized training and training on location.

Experience

Our well-known courses are backed by 20 years of experience serving large companies. All the speakers are recognized professionals in the field of datacommunications, with great teaching skills and professional experience between 10 and 32 years, who have developed the courses they teach.

The training is accompanied by valuable and comprehensive documentation, which is carefully revised and updated, providing the attendees with the necessary knowledge to solve real problems they may be faced with.

Quality

Quality is one of the most important aspects of the training. Thorough and constant control of all courses, preparation of the speakers, and adapting the courses to technological reality are prime objectives. Feedback from the attendants, gathered over all the years we've been active, indicates the level of quality offered by the training. Some facts (result from the latest 4,000 surveys):

- Speakers: 8.6 – Case Studies: 8.7 (ratings on a scale of 10)
- Customer retention: 86.3%
- Percentage of attendees who recommend our courses: 99.7%

Full dedication

Our objectives are to provide professionals with the necessary skills to implement and maintain solutions with quality and efficiency. We have the most comprehensive offering of courses in the world market for training in ICT, both in terms of coverage of topics, and with regard to the depth and practical approach with which they are treated.

Independence

The objective of our company is solely to maintain a high level training portfolio; there is no interest in any type of commercial hardware or software, or any other link to commercial goods or services.

The training provided focuses entirely on technology and markets, and is determined by what is drawn from practice and professional experience. This will guarantee that attendees obtain a true and realistic knowledge of these technologies, free from any subjective interference.

Course levels

- 100 – Basic level: Professionals with general knowledge of information technology. Some experience in communications technology is recommended
- 200 – Medium level: Professionals with previous experience in telecommunications
- 300 – High level: Professionals with ample experience in communications technology
- 400 – Advanced level: Experts. Highly specialized training on new technologies



- “We have had great Pleasure in sharing Knowledge and Experience with Neutral parties” F. Grogan, UK
- “This high level of Support will Help develop our Business” S. Haouala, Tunisia
- “Above all, the Talk was really Captivating” J. Molina, Spain
- “A valuable insight into the concept of Triple Play and related Technologies” R. Obiodu, France
- “This Training Course was far more effective than Consulting Services” C. Diakonikolaou, Greece

> Held throughout

in several countries across Europe,
Middle East and Far East.

- > One-day events divided into two sessions:
a technology **training course**
and a **hands-on session**
using specialised test equipment.

- > Why are these training courses **UNIQUE**:

- **Content:** Inside information on new technologies and high-performance networks.
- **Quality:** Industry experts will address and debate the key issues affecting the sector.
- **Opportunity:** This is your opportunity to define a smooth migration path to a network that combines legacy systems with new technologies.

Your Leading Expert

Fran Hens

Marketing Manager at Albedo Telecom.
MS/MA UPC

Francisco as integrator has designed VoIP and IPTV monitoring systems and has also worked as product manager in ICT electronics and Marketing Engineer at Trend. Author of 5 books on SDH, ADSL, Carrier Ethernet, Synchronous Ethernet, VoIP, IPTV and Triple Play networks.

José M. Caballero

General Director Albedo Telecom.
MBA, MS/MA in Communications.

Jose M. has 20 years of experience in IT development, consulting and marketing in IBM, and ICT electronics. Author of articles and six books on telecommunication technologies such as SDH, Carrier Ethernet and Triple Play, he is a frequent speaker in conferences and seminars.

Leo Nederlof

Independent Telecom Consultant
MSc, Delft University

Leo has worked for Alcatel in Belgium and by Corning Inc. in the US. His areas of expertise include communication systems and protocols, network architecture and technology, and modeling of networks and traffic. As an active member of the research community, Leo has authored many papers in magazines and conferences, providing of network design, integration of next generation networks.

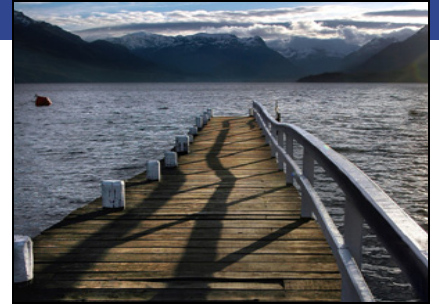


aims

- + LEARN from business models and case studies
- + UNDERSTAND the potential of interoperability with legacy services
- + EXPERIENCE specialised test equipment first hand
- + ASSESS different solutions for installation and maintenance

1- Access Technologies

Copper is still the main transmission medium in the local loop, followed by coaxial and fibre optic cables and wireless transmission. Digital Subscriber Loop (DSL) technologies, designed for digital transmission over existing copper lines, combine cost-effectiveness with acceptable performance.



Course Contents

1. Broadband Services over Copper

- The Limits of Copper Transmission
- ADSL2
- ADSL2+
- Bonded DSL
- VDSL

2. Passive Optical Network

- Basic Operation, Advantages,
- Broadband PON
- Gigabit PON
- Ethernet PON
- Ethernet in the First Mile
- Ethernet over Copper Pairs
- Ethernet in Optical Access Networks

3. ADSL

- The Origin of DSL technologies
- HDSL
- Modulation Technologies
- Asymmetry
- ADSL Transceivers
- Framing
- Data and Overhead Buffers
- Superframes
- Coding
- Error Protection
- Scrambling
- Interleaving
- DMT Modulation
- Operation and Maintenance Channel
- Initialization

4. Qualification Strategies and Protocols

- Prequalification
- Qualification During Commissioning
- Commissioning Without Qualification

5. Copper Pair

- Attenuation and Distortion
- Return Loss
- Noise
- Longitudinal Conversion Loss
- Crosstalk
- other defects

6. ATM Basics

- ATM Cell Format
- Virtual Channels and Virtual Paths

- ATM Switching

7. ATM Network Architecture

- AAL Layer
- ATM Layer
- Physical Layer

8. ATM Adaptation Layer Structures

- AAL1 Format
- AAL2 Format
- AAL3/4 Format
- AAL5 Format

9. Measurements

- One-End Measurements
- Two-End Measurements
- Bridged Measurements
- Digital Measurements

10. Service Provisioning

Course Profile

- Target groups: network designers, engineers, sales and marketing staff
- Prerequisites: None
- Duration: 10 h - Two sessions
- Evaluation: Test (upon request)
- Languages: English or Spanish

Course Kit

- First Mile book
- Presentation slides
- 10 x Pocket Guides
- White Papers

2 - Ethernet Networks

Ethernet has outlived all other LAN technologies, and nowadays it is used in almost all installations. Although this technology initially had a limited performance, a number of important reasons made Ethernet a winner: low cost, simplicity, flexibility and scalability.



Course Contents

1 Brief History of Ethernet

- ALOHAnet
- Ethernet in Palo Alto

2. Architecture

- Physical Media
- Multiple Physical Media
- Media-Independent Interfacing Medium Access Control (MAC)
- CSMA/CD
- Collisions
- Jam Signal
- Ethernet Frames
- Formats
- Frame Fields

3. The Evolution of Ethernet

- From Shared to Dedicated Media
- From Shared to Dedicated Bandwidth
- Frame Bursting in Gigabit Ethernet
- Switched Ethernet Networks
- Full-Duplex Operation
- Flow Control
- Virtual LAN
- Auto-Negotiation

4. Network Topologies

- The Logical Link Control Layer
- The Network Layer
- The Internet Protocol
- Address Resolution Protocol

5. 1000BASE-X Architecture

- Physical Coding Sublayer
- Physical Medium Attachment
- Physical-Medium Dependent
- 1000BASE-X Auto-Negotiation

6. 1000BASE-T Architecture

- Physical Coding Sublayer
- Physical Medium Attachment
- 1000BASE-T Auto-Negotiation

7. Installing Gigabit Ethernet

- Migration to Gigabit Ethernet
- Gigabit Interface Converter
- 10 Gigabit Ethernet
- Architecture
- Compatibility with SDH/SONET
- Gigabit and 10 Gigabit Applications
- LAN Applications

- MAN Applications
- WAN Applications

8. The Future of Ethernet

- Ethernet as a MAN/WAN Service
- Network Architecture
- Virtual Ethernet Connections
- Multiplexing and Bundling
- Generic Service Types
- Connectivity Services

Course Profile

- Target group: Technicians, Engineers, Support, Sales and Marketing staff
- Prerequisites: None
- Duration: 5 h - One sessions
- Evaluation: Test (upon request)
- Price: Request a quotation
- Language: English or Spanish

Course Kit

- Gigabit Ethernet book
- Presentation slides
- 10 x Pocket Guides
- White Papers

3 - Carrier Ethernet Networks

Incumbent and competitive operators are now providing Ethernet-based telecommunications services. Ethernet is becoming a real alternative for both traditional data-based applications such as Virtual Private Networks (VPN), and new ones like Triple Play. The Carrier Ethernet training course thoroughly explores all the features that have made Ethernet the standard technology and discusses the latest developments.



Course Contents

1 Brief History of Ethernet

- ALOHAnet, Ethernet in Palo Alto

2. Architecture

- Physical Media
- Multiple Physical Media, Media-Independent Interfacing Medium Access Control (MAC)
- CSMA/CD, Collisions, Jam Signal
- Ethernet Frames
- Formats, Frame Fields

3. The Evolution of Ethernet

- From Shared to Dedicated Media, from Shared to Dedicated Bandwidth, Frame Bursting in Gigabit Ethernet
- Switched Ethernet Networks
- Full-Duplex Operation, Flow Control, Virtual LAN, Auto-Negotiation

4. Network Topologies

- The Logical Link Control Layer
- The Network Layer
- The Internet Protocol, Address Resolution Protocol

5. 1000BASE-X Architecture

- Physical Coding Sublayer, Physical Medium Attachment, Physical-Medium Dependent, 1000BASE-X Auto-Negotiation

6. 1000BASE-T Architecture

- Physical Coding Sublayer, Physical Medium Attachment, 1000BASE-T Auto-Negotiation

7. Installing Gigabit Ethernet

- Migration to Gigabit Ethernet, Gigabit Interface Converter
- 10 Gigabit Ethernet
- Architecture, Compatibility with SDH/SONET
- Gigabit and 10 Gigabit Applications
- LAN Applications, MAN Applications, WAN Applications

8. The Future of Ethernet

- Ethernet as a MAN/WAN Service
- Network Architecture, Virtual Ethernet Connections, Multiplexing and Bundling, Generic Service Types, Connectivity Services

9. End-to-End Ethernet

- Optical Ethernet
- Ethernet over WDM, and SDH

10. Limitations of Bridged Networks

- Scalability
- Protection
- Topologies
- (QoS)

11. Multi-Protocol Label Switching

- Label Distribution and MPLS Forwarding Plane
- Martini Encapsulation
- Pseudowires, Ethernet Pseudowires, PWE3 and NG-SDH, Advantages of MPLS

12. Migration

- Migrating the Architecture, Legacy Services,
- Introduction to NG-SDH + Ethernet, NG-SDH + Virtual Ethernet Services, NG-SDH + MPLS + PWE3 + Ethernet,
- Service Internetworking,
- Ethernet + MPLS – urbi et orbe?

13. QoS in Ethernet Networks

- Traffic Marking, Traffic Conditioning, Congestion Avoidance

14. Application Requirements

- Service Attributes, Bandwidth Profile Parameters
- Service Performance Parameters, Network Service Parameters
- Class-of-Service Labels

15. Gigabit Ethernet Testing

- Approval and Acceptance Tests
- Ethernet Testing Suite
- Performance Testing
- RFC 2544 Test

16. Cable Testing

- Cable Categories, Wiremap,
- Advanced Cable Testing,
- Characteristic Impedance, Insertion Loss or Attenuation,
- Return Loss, Crosstalk, Delay Parameters
- Higher-Layer Testing
- Testing Tools, ICMP Analysis, Sniffers
- Cell Format, Virtual Channels and Virtual Paths, ATM Switching

Course Profile

- Target group: Engineers, Marketing staff
- Prerequisites: None
- Duration: 10 h - Two sessions
- Evaluation: Test (upon request)
- Price: Request a quotation
- Language: English or Spanish

Course Kit

- Carrier Ethernet book
- Presentation slides
- 10 x Pocket Guides
- White Papers

4 - Carrier Ethernet & MPLS

This course will outline the latest developments of this technology, as well as the solutions for the Aggregation, Transport and Backbone Networks focusing on the evolution of the Ethernet based Network Infrastructures, and the new MPLS technologies based on IP datagrams for high performance networks' interconnection.



Course Contents

1. ETHERNET IN NEXT-GEN NETWORKS

- Looking for the universal services network...
- What service providers want to offer
- What standards committees are doing
- Definition of different types of networks
- Vision of the NGN (ITU-T)
- Ethernet and IP Transport
- Advances services infrastructures
- Possibilities and realizations with Ethernet

2. STANDARDIZATION: MEF – ITU – IETF

- Ethernet services standardization
- Metro Ethernet Forum
- Basic service model based on ETH
- Ethernet Virtual Connection
- "Carrier Ethernet": MEF current limitations
- ITU-T Recommendations: Series G, Q, X, Y
- IETF – RFCs
- EFM market and future

3. Ethernet based access: efm-GPON

- IEEE 802 – 802.1 standards
- IEEE 802.3ah – EFM
- EFM: P2P topologies
- EFM: EFM-PHY over Copper
- EFM: EFMF (point-to-point Fiber)
- EFM: EFM P2MP (point-to-multipoint) standards
- FTTH - EPON, GPON, WPON
- EFM/OAM

4. MPLS architecture

- Evolution of IP backbone networks
- Emergence of MPLS & GMPLS
- MPLS switching
- Architecture:
- Router types: ingress, LSR, egress
- Basic functionality
- Label Switched Path (LSP)
- Headers
- Label encapsulation
- FEC - NHLFE
- MPLS functions and operations

5. MPLS signaling protocols

- Functions and types
- Building the MPLS label swapping tables
- Label distribution and table creation
- Example of operation

- Protocol description:
- LDP, RSVP-TE, CR-LDP
- Summary and considerations

6. CARRIER ETHERNET TECHNOLOGIES

- Ethernet-based networks
- 802.1ad
- Bridging issues VLANs in 802.1ah
- Provider Bridging types
- MAC sublayer organization in 802.1ah
- Solutions based on Label Swapping
- PWE3: Architecture
- VPLS: Architecture
- T-MPLS: Architecture
- PBT (Provider Backbone Transport)
- PBB-TE (PBB-Traffic Engineering)
- GMPLS Ethernet PBB-TE
- Overview of Label Swapping solutions
- Solutions based on SR+DA
- Source Routing elements in Ethernet
- Ethernet Administration and Management

Course Profile

- Target group: Engineers, Marketing staff
- Prerequisites: None
- Duration: 10 h - Two sessions
- Evaluation: Test (upon request)
- Price: Request a quotation
- Language: English or Spanish

Course Kit

- Carrier Ethernet book
- Presentation slides
- 10 x Pocket Guides
- White Papers

5 - GMPLS the new Control Plane

This course describes in detail the GMPLS control plane, that is used in new advanced communications systems (optical crossconnects, fiber switch, etc), studying signaling protocols, traffic engineering and architecture according to the IETF standards. It is a follow-up to the MPLS course.



Course Contents

1. From MPLS to GMPLS

- Telecommunications Networks Structures
- IP transport over multiple technologies:
- ATM, SDH, WDM
- Basic network engineering and metrics
- Management aspects
- Objectives
- MPLS development
- Issues with optical networks
- Control planes
- IETF
- OIF
- ITU-T
- Scenarios
- Standards

2. Traffic engineering

- What is the purpose?
- Benefits in datagram networks
- Explicit routes
- Route calculation: off-line, on-line
- On-line protocols
- CSPF (Constrained Shortest Path First)
- TE extensions
- Characteristics and operation
- Advanced aspects in networks
- Preemption, reoptimization, load balancing
- Traffic protection
- Rerouting, protection switching
- Local repair, path protection
- Resource management

3. GMPLS signaling protocols

- RSVP-TE Characteristics
- Formats, Operation
- CR-LDP Characteristics
- Formats, Operation
- RSVP-TE and CR-LDP in GMPLS

4. GMPLS architecture

- MPLS control plane extensions
- Evolution of the control plane for GMPLS
- Propagation of Lambdas
- Interface types
- PSC type: capability to recognize packets
- TDM type: capability to recognize TDM, SDH, ..
- LSC type: capability to recognize Lambdas
- FSC type: capability to recognize Fiber-Switch

- GMPLS scenarios
- GMPLS components
- TE routing protocols
- LMP (Link Management Protocol)
- Functions
- Messages
- NI and E-NNI
- Functionality of GMPLS LSR equipment
- OXC: control plane components
- LSP establishment in GMPLS
- Nested LSPs of different technologies
- Complex example: control plane – data plane
- Interconnection of multiple networks
- Interoperability testing

Course Profile

- Target group: Engineers, Marketing staff
- Prerequisites: None
- Duration: 10 h - Two sessions
- Evaluation: Test (upon request)
- Price: Request a quotation
- Language: English or Spanish

Course Kit

- MPLS / GMPLS book
- Presentation slides
- 10 x Pocket Guides

6 - SDH Architectures

SDH (Synchronous Digital Hierarchy) is an international ITU-T standard that defines a common architecture for telecommunications services on a worldwide scale and efficiently replaces PDH (Plesiochronous Digital Hierarchy).



Course Contents

1 Introduction to Communications Systems

- Signals and Information, Transmission Media
- Channel Coding, Multiplexing
- Multiple Access, Pulse Code Modulation

2. PDH and T-Carrier

3. Basic Rates: T1 and E1

- E1 Frame, Frame Alignment, Frame Alignment Signal
- Multiframe CRC-4, Supervision Bits
- NFASs - Spare Bits, NFAS - Alarm Bit, Signalling Channel
- CAS Signalling Multiframe

4. PDH

- Higher Levels, 8 Mbit/s, 34 Mbit/s, and 140 Mbit/s
- Service Bits in Higher Level Frames,
- Plesiochronous Synchronization, Positive Justification

5. The T-Carrier Hierarchy

- DS1 Frame, DS2 Frame, DS3 Frame

6. SDH/SONET Networks

- Limitations of Plesiochronous Networks,
- SDH/SONET Challenges

7. Comparison of SDH and SONET

- Functional Architecture
- Network Elements, Network Topology
- Topology Partitioning, SDH/SONET Layers

8. SDH/SONET Formats and Procedures

- SDH/SONET Frame Structure, Multiplexing Map

9. SDH Transport Services

- Transporting PDH/T-Carrier Tributaries
- Transport on VC-4 or STS-3c SPE
- Transport on VC-3, Transport of 2-Mbit/s Circuits

10. Pointers and Timing Compensation

- Payload Synchronisation, Pointer Formats and Procedures

11. Overheads

- Path Overhead, Section Overhead, the SDH/SONET Hierarchy

12. Concatenation

13. Maintenance

- SDH/SONET Events, Monitoring Events, Event Tables

14. Performance Monitoring

- Bit Error (BER) Checking, Forward Error Correction (FEC)
- Tandem Connection Monitoring (TCM),

15. SDH Resilience

- Protection Basics
- Multiplex Section or Line Protection

16. Operation, Administration and Maintenance

- The Telecommunications Network Management (TMN)
- Standard and Benefits

17. Synchronisation Networks

- Synchronisation Network Topologies
- Interconnection of Nodes
- Synchronisation Signals
- Holdover Mode
- Global Positioning System (GPS)
- Disturbances in Synchronisation Signals
- Frequency Offset, Phase Fluctuation

18. Synchronisation of Transmission Networks

- Synchronisation in SONET / SDH
- Synchronisation Models
- Timing Loops
- Digital Synchronisation and Switching
- Synchronisation Network
- Functions of SSU

19. Test and Measurement

- Areas of Application for Test and Measurement
- Interface Testing
- Connection Modes in Electrical Interfaces
- Measurements in Electrical Interfaces
- Measurements in Optical Interfaces
- Frequency Measurements
- Bit Error Rate
- Out-of-Service Measurements
- In-Service Measurements
- Synchronisation of NE-Test Set in SDH

Course Profile

- Target group: Network designers, Installers, Operators
- Prerequisites: Basic knowledge of transmission
- Duration: 10 h - two sessions
- Evaluation: Test (upon request)
- Language: English or Spanish

Course Kit

- NG-SDH book
- Presentation slides
- 10 x Pocket Guides
- White Papers

7 - NG - SDH Architectures

The financial and technological cycle of the telecom industry is forcing manufacturers, carriers, operators and standards organizations to move towards a new network that reduces costs while offering new services. Luckily, SDH/SONET has also evolved to more efficiently adapt to statistical multiplexing and traffic based on data packets, especially Ethernet.



Course Contents

1 The Emergence of SDH/SONET Networks

- The limitations of Plesiochronous Networks
- SDH/SONET Challenge

2. Comparison of SDH and SONET

3. Functional Architecture

- Network Elements
- Network Topology
- Topology Partitioning
- SDH/SONET Layers

4. SDH/SONET Formats and Procedures

- SDH/SONET Frame Structure
- Multiplexing Map

5. SDH Transport Services

6. Transporting PDH/T-Carrier Tributaries

- Transport on VC-4 or STS-3c SPE
- Transport on VC-3
- Transport of 2-Mbit/s Circuits

7. Pointers and Timing Compensation

- Payload Synchronisation
- Pointer Formats and Procedures

8. Overheads

- Path Overhead
- Section Overhead
- SDH/SONET Hierarchy
- Concatenation

9. Maintenance

- SDH/SONET Events
- Monitoring Events
- Event Tables

10. Performance Monitoring

- Bit Error Checking
- Tandem Connection Monitoring (TCM)
- Forward Error Correction (FEC)

11. SDH Resilience

- Protection Basics
- Multiplex Section or Line Protection

12. Operation, Administration and Maintenance (OAM)

- The TMN Standard
- TMN Benefits

13. Legacy and Next Generation SDH

- Streaming Forces
- Evolution of Transmission Network

14. The Next Generation Challenge

- New Network Elements
- Core Transport Services
- Next-Generation SDH

15. Generic Framing Procedure (GFP)

- Frame-Mapped GFP
- Transparent GFP

16. Concatenation

- Contiguous Concatenation of VC-4
- Virtual Concatenation (VCAT)
- VCAT Setup

17. Link Capacity Adjustment Scheme (LCAS)

- What is LCAS?
- LCAS Applications

18. NG SDH OAM

19. Test and Measurement

- Areas of Application for Test and Measurement
- Interface Testing, Connection Modes in Electrical Interfaces
- Measurements in Electrical Interfaces
- Measurements in Optical Interfaces
- Frequency Measurements
- Bit Error Rate
- Out-of-Service Measurements
- In-Service Measurements
- Synchronisation of NE-Test Set in SDH

Course Profile

- Target group: Network designers, engineers
- Prerequisites: knowledge of SDH transmission
- Duration: 10 h - two sessions
- Evaluation: Test (upon request)
- Language: English or Spanish

Course Kit

- NG-SDH book
- Presentation slides
- 10 x Pocket Guides
- White Papers

8 - Synchronisation

SDH nodes must remain tightly synchronised. In transmission networks, synchronisation failures cause service degradation. In mobile networks, it has been shown that bad synchronisation increases the risk of handover failures.



Course Contents

1. Emergence of SDH/SONET Networks

- Limitations of Plesiochronous Networks
- SDH/SONET Challenge

2. Functional Architecture

- Network Elements
- Network Topology
- Topology Partitioning
- SDH/SONET Layers

3. SDH/SONET Formats and Procedures

- SDH/SONET Frame Structure
- Multiplexing Map

4. SDH Transport Services

5. Transporting PDH/T-Carrier Tributaries

- Transport on VC-4 or STS-3c SPE
- Transport of 2-Mbit/s Circuits

6. Pointers and Timing Compensation

- Payload Synchronisation
- Pointer Formats and Procedures

7. Overheads

- Path Overhead
- Section Overhead
- SDH/SONET Hierarchy

8. Concatenation

9. Performance Monitoring

- Bit Error (BER) Checking
- Tandem Connection Monitoring (TCM)
- Forward Error Correction (FEC)

10. SDH Resilience

- Protection Basics, Multiplex Section or Line Protection

11. Synchronisation Networks

- Synchronisation Network Topologies

12. Interconnection of Nodes

- Synchronisation Signals
- Holdover Mode
- Global Positioning System (GPS)

13. Interferences in Synchronisation Signals

- Frequency Offset
- Phase Fluctuation

14. Synchronisation of Transmission Networks

- Synchronisation in SDH/SONET
- Synchronisation Models
- Timing Loops

15. Digital Synchronisation and Switching

- Synchronization Supply Units (SSU) in a Sync. Network
- Functions of SSU

16. Dealing with Jitter

- Phase Fluctuation
- Jitter Metrics and Measurement
- Measuring Jitter in Output Interfaces
- Measuring Jitter Tolerance
- Measuring Jitter Transfer
- Mapping Jitter and Combined Jitter
- Jitter in Leased Lines

17. Dealing with Wander

- Synchronisation of SDH/SONET Networks
- Measuring Relative
- Absolute Wander
- The Metrics of Wander: TIE, MTIE, and TDEV
- Measuring Output Wander
- Measuring Tolerance to Input Wander
- Measuring Wander Transfer
- Response to Phase Transients
- Operating in Holdover Mode

18. Tests on ADMs and Cross-Connects

- Measuring Jitter
- Synchronisation Tests

Course Profile

- Target group: Network designers, engineers
- Prerequisites: Basic knowledge of transmission
- Duration: 7.5 h
- Evaluation: Test (upon request)
- Language: English or Spanish

Course Kit

- Copper Qualification book
- Presentation slides
- 10 x Pocket Guides
- White Papers

9 - Triple Play Services

The decline of the traditional voice business, together with the ever-increasing competition between companies is pushing the telecommunications industry to provide more services in a more flexible way. This new strategy is based on Triple Play, a bundle of voice, video, and data services for residential customers.



Course Contents

1 Expanding the Business

- Triple Play Market
- Triple Play Applications
- Television and Video Services, Video on Demand (VoD)
- New TV Receivers
- Voice over IP (VoIP) VoIP Roll-out

2 Driving factors of Triple Play

- Re-defining the Business, Competitive Pressure
- New Strategies
- Service Bundling and Network Convergence
- Quadruple Play,
- VoD: the Key Difference, Making a Success Story

3 Real-Time Transport Protocol (RTP)

- Synchronisation Sources and Contributing Sources
- Translators and Mixers, The RTP Packet
- Stream Multiplexing, Security
- Real-Time Control Protocol (RTCP)
- RTCP Packet Types and Formats
- QoS Monitoring, Source Description
- Session Management

4 Session Initiation Protocol (SIP)

- Standardisation, Architectural Entities, Basic SIP Signalling
- Session Description Protocol, Security Issues,
- Service Architecture and Protocol Extensions,
- Firewall Traversal, Internetworking with the PSTN

5 QoS Basics and Provision

- Traffic Differentiation, Congestion Management
- End-to-End Performance Parameters
- One-Way Delay, One-Way Delay Variation
- Packet Loss, Bandwidth
- Marking, Traffic Flows, Traffic Classes, Scheduling
- Congestion Avoidance, Admission Control
- Congestion Control and Recovery
- Bandwidth Profile Characterisation
- Negotiated QoS Parameters
- ATM Service Categories
- SLA in ATM Networks, Resource Management
- The Failure of ATM
- QoS in IP Networks
- The Integrated Services Architecture
- The Reservation Protocol
- The Differentiated Services Architecture

6 IP Multicasting

- IP Multicast Groups and Their Management

- Multicasting in Ethernet Networks
- Multicasting and Internet Group Management Protocol (IGMP)
- Multicast Routing Algorithms

7 Broadband Access

- Services over Copper
- The Limits of Copper Transmission
- ADSL2, ADSL2+, Bonded DSL, VDSL, VDSL2
- Passive Optical Network, Basic Operation, Advantages
- Broadband PON, Gigabit PON, Ethernet PON
- Ethernet in the First Mile, Ethernet over Copper,
- Ethernet in Optical Access Networks
- Ethernet as a MAN/WAN Service
- Network Architecture, Virtual Ethernet Connections
- Multiplexing and Bundling
- Generic Service Types, Connectivity Services

8 End-to-End Ethernet

- Optical Ethernet, Ethernet over WDM, SDH
- Limitations of Bridged Networks
- Scalability, Protection, Topologies, Quality of Service
- Multi-Protocol Label Switching
- Labels, MPLS Forwarding Plane, Label Distribution
- Martini Encapsulation, Pseudowires, Ethernet Pseudowires
- PWE3 and NG-SDH
- Advantages of MPLS

9 Migration

- Migrating the Architecture, Legacy Services
- NG-SDH + MPLS + PWE3 + Ethernet
- Service Internetworking, Ethernet + MPLS – urbi et orbe?

10 The Next-Generation Challenge

- New Network Elements, Core Transport Services
- Next-Generation SDH

Course Profile

- Target group: Network designers, engineers, marketing staff
- Prerequisites: basic TCP/IP
- Duration: 10 h - two sessions
- Evaluation: Test (upon request)
- Price: request a quotation
- Language: English or Spanish

Course Kit

- Triple Play book
- Presentation slides
- 10 x Pocket Guides
- White Papers

10 - Voice over IP

Although Voice over IP (VoIP) started out as an alternative technology, carriers and service providers are now taking advantage of it to make installation and management tasks easier and more cost-effective, or to integrate fixed and mobile services.



Course Contents

1. Voice Signal Coding

- Network Performance Parameters
- Opinion Quality Rating
- Objective Quality Assessment
- Market Segments

2. The Real-Time Transport Protocol

- Synchronisation Sources
- Contributing Sources
- Translators and Mixers
- RTP Packet
- Stream Multiplexing
- Security

3. The Real-Time Control Protocol

- RTCP Packet Types and Formats
- Quality of Service Monitoring
- Source Description
- Session Management (BYE Packet)

4. The Session Initiation Protocol

- SIP Standardisation
- Architectural Entities
- Basic SIP Signalling Mechanisms
- Session Description Protocol
- Security Issues
- Service Architecture and Protocol Extensions
- Firewall Traversal
- Internetworking with PSTN

5. QoS Basics

- Traffic Differentiation
- Congestion Management

6. End-to-End Performance Parameters

- One-Way Delay
- One-Way Delay Variation
- Packet Loss
- Bandwidth

7. QoS Provision

- Marking
- Traffic Flows
- Traffic Classes
- Scheduling
- Congestion Avoidance
- Admission Control
- Resource Management
- Congestion Control and Recovery

8. QoS in ATM Networks

- Bandwidth Profile Characterisation
- Negotiated QoS Parameters
- ATM Service Categories
- SLA in ATM Networks
- Resource Management
- Failure of ATM

9. QoS In IP Networks

- Integrated Services
- Reservation Protocol
- Differentiated Services

Course Profile

- Target group: Network designers, engineers, sales, marketing and IT staff
- Material included: Book, slides, CD-ROM, pocket guides
- Prerequisites: basic TCP/IP
- Duration: 10 h - two sessions
- Evaluation: Test (upon request)
- Price: request a quotation
- Language: English or Spanish

Course Kit

- VoIP book
- Presentation slides
- 10 x Pocket Guides
- White Papers

11 - Audiovisual Services over IP

Bundling TV and video with data and voice services is more than just a marketing plan. It is a very ambitious strategy with well-defined targets to reduce churn, gain customer loyalty, minimize costs, gain TV customers, increase profits, grow the brand name and enable network convergence.



Course Contents

1 Business Strategies

- Expanding Telco Businesses
- Digital Television
- The Internet and Television

2. Triple Play Applications

- Television and Video Services
- Video on Demand
- New TV Receivers
- Voice over Internet Protocol
- VoIP Roll-Out

3. Driving Factors of Triple Play

- Business Redefinition
- Competitive Pressure

4. Telcos Strategies

- Service Bundling and Network Convergence
- Quadruple Play
- VoD: the Key Difference
- Making a Success Story
-

5. IPTV Business Models

- Strengths
- Opportunities
- Weaknesses
- Threats

6. Regulatory framework

7. Architectural Design

- Television services Roll-out
- Business Model Definition
- Head-end
- Distribution Network
- Subscriber Site

8. Television and Video Services and Applications

- IPTV Protocols
- Video-on-demand Services
- Personal Video Recording Services
- Converged Telephony

9. Formats and Protocols

- Analogue TV
- Digital TV
- Audio and Video Codecs

10. How a MPEG-2 Works

- MPEG-2 Levels and Profiles

- MPEG Compression
- MPEG Stream Generation Scheme
- The Transport Stream
- Packet Distribution and Delivery

11. Introduction to MPEG-4

- What is MPEG-4?
- Markets and Applications
- Related Standards
- MPEG-4 Levels and Profiles
- Rich Multimedia Framework
- Interoperability

12. Windows Media and VC-1

- VC-1 Profiles and Levels

13. Service Provision

- Quality of Experience
- Service provision

14. Network Impairments

- Service assurance
- Content Faults
- Network impairments
- Transaction Impairments
- Transport impairments
- Media Delivery Index

Course Profile

- Target group: Network designers, engineers, sales, marketing and IT staff
- Material included: Book, slides, CD-ROM, pocket guides
- Prerequisites: basic TCP/IP
- Duration: 10 h - two sessions
- Evaluation: Test (upon request)
- Price: request a quotation
- Language: English or Spanish

Course Kit

- IPTV and VoD book
- Presentation slides
- 10 x Pocket Guides
- White Papers

12- Quadruple Play and IMS

Multimedia conferencing and mobile TV are strategic services for mobile operators, but fixed operators are also looking for mechanisms to add mobility to their services. Residential Internet connections based on Wireless LAN (WLAN) or mobile phones with WLAN connectivity are good examples of this.



Course Contents

1 Triple and Quadruple Play

- Business redefinition
- Competitive Pressure
- Service Bundling and Network Convergence
- FMS and FMC

2. The Global System for Mobile Communications

- The TDMA/FDMA air interface
- The GSM network reference model
- Data over GSM, CSD, HSCSD, GPRS, EGPRS/EDGE

3. The Universal Mobile Telephone System

- The WCDMA air interface
- High Speed Packet Access, HSDPA, HSUPA
- The UMTS Terrestrial Radio Access Network

4. Long Term Evolution of 3GPP Networks

- The HSOPA air interface
- MIMO and other smart antenna technologies
- The E-UTRAN and the AIPN

5. Wireless Local Area Networks

- WLAN applications
- Hotspots, Femtocells
- Wireless mesh networks
- Wi-Fi, radio bands
- FHSS, DSSS and OFDM air interfaces, CSMA/CA
- WLAN integration in mobile networks, GAN/UMA

6. Wireless Metropolitan Area Networks

- WiMAX, allocated radio bands
- OFDM air interface
- MAC layer
- Performance
- WiMAX and 3GPP network integration
- WiMAX network reference model, I-WLAN

7. The Session Initiation Protocol

- IETF Standardization, MMUSIC and SIP working groups
- User identity, SIP and SIPS URIs
- User agents
- Proxy servers
- Redirect servers
- Registrars
- SIP Basic Signalling Mechanisms
- Registration
- Call origination
- The Session Description Protocol
- End-to-end security
- Hop-by-hop security

- IPSec, TLS, S/MIME
- Service Architecture and Protocol Extensions
- SIP instant messaging, supplementary services
- Firewall Traversal, types of NAT, UPnP, STUN, TURN, ICE
- Internetworking with the PSTN
- Gateway decomposition, trunking and access MGs

8. The IP Multimedia Subsystem

- IMS advantages
- Unified billing
- Single sign on
- Custom services, FMC
- 3GPP Standardization
- The Call Session Control Function
- P-CSCF, S-CSCF, I-CSCF
- Main Architectural Entities
- HSS, MRFP, MPRC, MGW, MGCF

9. Services

- Application Server
- Open Services Architecture
- Voice Call Continuity
- GSM and UMTS user identities
- IMS private and public identities, GRUUs
- AAA, RADIUS, Diameter, AAA agents
- Policy and Charging Control
- SBLP, FBC
- Off-line and on-line charging
- PCEF and PCRF
- Basic Procedures
- Registration,
- Call origination
- The Next Generation Network
- ITU-T and ETSI TISPAN standardization

Course Profile

- Target group: Network designers, engineers
- Prerequisites: Basic TCP/IP architecture, Wireless networks
- Duration: 10 h - Two sessions
- Evaluation: Test (upon request)
- Price: Request a quotation
- Language: English or Spanish

Course Kit

- Quadruple Play and IMS book
- Presentation slides
- 10 x Pocket Guides
- White Papers

10 Reasons to Attend

1. Stay abreast of the latest technologies
2. Meet colleagues facing the same issues
3. Gain valuable insight
4. Carrier Ethernet is a must for converged networks
5. The Triple Play market is growing 250% annually
6. Evaluate a key equipment vendor
7. Learn from others who already use these technologies
8. Assess the financial viability of installing these services
9. Discuss your network and needs
10. Receive inside information never published before

Course Kits



Participants will receive an information bag full of documents: the Course book, a collection of Application Notes, Technology Pocket Guides, and the Course slides.

Worth more than 500 EUR!

Delegate Details

Please complete fully and clearly in CAPITAL letters

Full Name.....
 Job Title.....
 Department.....
 E-mail.....
 Address.....
 Town/Postcode.....
 County/Region.....
 Phone/Mobile.....
 Signature / Date:

Course Prices

- Access Network..... 995€
- Gigabit Ethernet 995€
- Carrier Ethernet..... 995€
- Carrier Ethernet and MPLS 995€
- GMPLS: the new control plane..... 450€
- Classic SDH 995€
- NG SDH 995€
- Full SDH (Classic, NG, Sync) 1800€
- Network Synchronization..... 995€
- Triple Play 1800€
- Voice over IP 995€
- IPTV, VoD, PVR 995€
- PDH, ISDN, Frame Relay 995€
- Quadruple Play and IMS 995€

Course Kit

I would like to purchase the following kits:

- Access Network450€
- Gigabit Ethernet450€
- Carrier Ethernet450€
- Carrier Ethernet and MPLS.....450€
- GMPLS: the new control plane450€
- Classic SDH.....450€
- NG SDH450€
- Full SDH (Classic, NG, Sync)850€
- Network Synchronization450€
- Triple Play650€
- Voice over IP.....450€
- IPTV, VoD, PVR.....450€
- PDH, ISDN, Frame Relay450€
- Quadruple Play and IMS450€

Payment

Payment must be made by:

- Bank Transfer
 - Credit Card VISA Mastercard Other
- Cardholder.....
 Card number
 Signature

terms and conditions

In the case of cancellations, L&M Albedo will refund 80% of the fee, if the cancellation is notified at least two weeks in advance. No refunds can be made for cancellations received less than one week prior to the conference. L&M ALBEDO may decide to cancel or change the dates of the training course up to one week before the start date of the course. The number of participants is limited to 10 – 25. L&M ALBEDO will reserve the right to choose the attendees. Participation is not free, however some participants may be eligible for free training.

Fill-up, scan and send this page to
info.telecom@albedo.biz