



Ceragon Training Syllabus

Ceragon System & Technology Overview

e-Learning

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Introduction

The ***Ceragon System & Technology Overview Training*** is a theoretical fundamentals course that aims to provide you with an understanding of the key radio and networking protocols relevant to microwave transmission networks.

After this course you will understand what the key features and benefits of the products forming the Ceragon's Microwave Networks portfolio.

Learning Objectives

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

1. Understand the Ceragon Values and FibeAir IP-20 platform benefits;
2. Explain the background and architecture of digital transmission networks;
3. Describe the Microwave Networks radio interface principles and parameters;
4. Introduce the Networking principles and relevant protocols (such as PDH, SDH, Ethernet, Spanning Tree Protocol with its variants, Ethernet Ring Protection Switching);
5. Describe the MEF Service Model;
6. Introduce TDM Pseudowire Solution;
7. Describe Synchronization Solutions;
8. Detail the Ceragon's FibeAir IP-20 Portfolio;

Target Audience

The Target audience for this course is:

Technician, System Engineer, Service Engineer, Network Design Engineer, Service Design Engineer

Prerequisites

The participants should be familiar with general telecom technologies.

Learning Situation

This course is a theoretical e-Learning course with a duration of 6.5 hours.



Course Content

The topics to be discussed during this training are:

- 1. Introduction to Ceragon and FibeAir IP-20 Platform**
 - 1.1. Introduction to Ceragon Networks
 - 1.2. Introduction to FibeAir IP-20 Platform
 - 1.3. Resolving your wireless backhauling challenges
 - 1.4. Small cells, C-RAN and D-RAN Applications
 - 1.5. The future of wireless backhaul communications

- 2. Introduction to Transmission Networks**
 - 2.1. Transmission Media
 - 2.2. Transmission Multiplexing Technologies
 - 2.3. TDM
 - 2.4. Transmission Technologies
 - 2.5. PDH,SDH
 - 2.6. Quality and Availability Targets

- 3. Introduction to Microwave Networks**
 - 3.1. Radio Relay Principles
 - 3.2. Parameters affecting propagations
 - 3.3. Modulation
 - 3.4. ACM & MSE
 - 3.5. SNR & BER
 - 3.6. Transmission Techniques
 - 3.7. XPIC
 - 3.8. SD
 - 3.9. LoS MIMO

- 4. Introduction to Radio Link Parameters**
 - 4.1. Radio Link Parameters
 - 4.2. MRMC scripts
 - 4.3. ACM & MSE
 - 4.4. Adaptive Transmit Power
 - 4.5. ATPC
 - 4.6. TX and RX frequency settings
 - 4.7. LINK ID
 - 4.8. Monitoring

- 5. Introduction to Ethernet**
 - 5.1. Local Area Network (LAN)
 - 5.2. Network Devices



- 5.3. OSI Layers
- 5.4. Ethernet Frame
- 5.5. TCP
- 5.6. VLAN concept
- 5.7. VLAN Tagging
- 5.8. Access vs Trunk Ports

6. Introduction to MSTP - Multi Spanning Tree Protocol

6.1. STP – Spanning Tree Protocol

- 6.1.1. How does STP work?

6.2. MSTP

- 6.2.1. Physical and Logical Topology
- 6.2.2. MST Instance
- 6.2.3. MST Region
- 6.2.4. Region Boundary
- 6.2.5. CST – Common Spanning Tree
- 6.2.6. BPDU

6.3. MSTP DEMO

- 6.3.1. MSTI root
- 6.3.2. Ports Role
- 6.3.3. Ports Definition
- 6.3.4. CIST
- 6.3.5. Interoperation between two Regions

6.4. How to configure MSTP

7. Introduction to G8032 ERPS - Ethernet Ring Protection Switching

- 7.1. G.8032 in General
- 7.2. G.8032 Principle
- 7.3. How can we balance our network?
- 7.4. What is the Instance?
- 7.5. RPL – Ring Protection Link
- 7.6. Recovery mechanism for G.8032

8. Introduction to MEF

- 8.1. Basic Ethernet Service Model
- 8.2. Ethernet Virtual Connection & types
- 8.3. E-LINE service
- 8.4. EPL – Ethernet Private Line service
- 8.5. E-LAN service
- 8.6. E-Three service



9. TDM Pseudowire

- 9.1. TDM over PSN
- 9.2. TDM Pseudowire supported Standards
- 9.3. General protocol
- 9.4. TDM Structure and Transport Mode
- 9.5. TDM PSW Configuration
- 9.6. 1:1 TDM Path Protection Pseudowire configuration with OAM

10. Synchronization Solution

10.1. Synchronization Overview

- 10.1.1. Synchronization Types
- 10.1.2. Synchronization Effects
- 10.1.3. Synchronization modes of operation

10.2. Synchronous Ethernet

- 10.2.1. SSM and ESMC
- 10.2.2. SyncE Clock Types

10.3. IEEE 1588 - PTP (Precision Time Protocol)

10.4. Synchronization in FibeAir IP-20 Platform

- 10.4.1. Native Sync Distribution
- 10.4.2. SyncE PRC Pipe Regenerator mode
- 10.4.3. IEEE-1588v2 PTP Optimized Transport

11. FibeAir IP-20 Portfolio

11.1. FibeAir IP-20 Platform

- 11.1.1. FibeAir IP-20C
- 11.1.2. FibeAir IP-20S
- 11.1.3. FibeAir IP-20E
- 11.1.4. FibeAir IP-20G
- 11.1.5. FibeAir IP-20GX
- 11.1.6. FibeAir IP-20F
- 11.1.7. FibeAir IP-20N
- 11.1.8. FibeAir IP-20LH
- 11.1.9. FibeAir IP-20A

11.2. PointLink Long-haul & Short haul Access

11.3. FibeAir FA2000/2500

11.4. Small cells, C-RAN and D-RAN applications

11.5. Management System

12. CeraOS 10.0 New Radio Frequency Units

13. Course Summary

14. Course Evaluation and Feedback



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