



Ceragon Training Syllabus

Network Operations and Maintenance

e-learning

[Ceragon Certified Support Professional]

Ceragon Training Services

REV. 0001 | 2019



Introduction

The **Ceragon Network Operations and Maintenance** is a complete e-learning program that aims to provide the student with knowledge and practical experience in the periodic maintenance, operation and management of faults, software and configuration, and performance for Ceragon equipment via the Web Element Management System & Network Management System (NetMaster).

After this course, you will understand how to manage Ceragon Network elements and what are the tools to perform monitoring, maintenance and troubleshooting actions.

Ceragon Certified Support Professional [CCSP]

The **[CCSP] Certification** attests to the fact that the participants have successfully passed the evaluation and gained the skills and knowledge to perform Network Operation, Monitoring and Maintenance on Ceragon FibeAir® IP-20 products, typical for Tier 1 Support.

General

Product	FibeAir® IP-20 Family & NetMaster NMS <i>[Advanced Level]</i>
Course Name	Network Operations and maintenance
Duration	10 Hours
Scope	Management tools oriented

Learning Objectives

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

1. Understand the Ceragon Network Management Tools, with their advantages and applications range;
2. Understand the network management standards and principles;
3. Understand the Ceragon Management Tools and how to perform various tasks;
4. Understand the FibeAir® IP-20 Family hardware physical characteristics;
5. Perform Hardware Management & Inventory;
6. Perform Configuration Management;
7. Run Performance Management;
8. Run different reports;
9. Configure Northbound Interfaces;
10. Understand Ceragon IP-20 Platform Services model
11. Perform End-to-End Services configuration
12. Perform 1-st line Troubleshooting, Health Check, Routine Maintenance.



Target Audience

The Target audience for this course is:
Front Office NOC Technician, System Engineer, Service Engineer.

Prerequisites

The participants should be familiar with general wireless access and/or transmission technologies.

Successful completion of the following course: ***Ceragon System and Technology Overview*** (ILT or WBL).

Learning Situation

This course is a theoretical e-Learning course with hands-on demos with a duration of 10 hours.

Course Content

The topics to be discussed during this training are:

1. Introduction to Ceragon Network Management tools

- Network Management Models
- EMS vs. NMS | CLI vs EMS
- System Overview and Architecture
- Client – Server Platform
- Main Management Features Overview
- NetMaster redundancy with failover
- System Design

2. SNMP Overview

- SNMP Protocol
- SNMP Configuration Evolution Family
- SNMP Configuration FibeAir Family
- Use SNMP traps
- SNMP trap structure
- MIB

3. OSS, Northbound Interface and Open SNMP

- OSS – Operations support system
- Northbound Interface
- Open SNMP



4. NetMaster Client and GUI Overview

- Client
- Objects in Application
- Perspectives
- Topology Views
 - Geographical / Logical Map
 - Geographical / Logical Tree
 - Managed Elements
 - Topological Links
- Network Explorer Perspective
 - Overview
 - Network Explorer Map
 - Network Explorer Tree
 - Relation Overview
 - Element Explorer

5. EMS Overview

- CLI login
- Web login
- General commands
- Web GUI Management and General Menu Overview
- Get IP address
- Set IP address
- Set to default

6. FibeAir IP-20 Platform Introduction (Main features and HW Overview)

- FibeAir IP-20C
- FibeAir IP-20C-HP
- FibeAir IP-20S
- FibeAir IP-20E
- FibeAir IP-20V
- FibeAir IP-20G
- FibeAir IP-20GX
- FibeAir IP-20F
- FibeAir IP-20N
- FibeAir IP-20LH
- FibeAir IP-20A
- Radio Frequency Units with IF Cable
- Radio Frequency Units with RF interface Cable

7. Hardware Management

- Connecting to units
- IP-20N Chassis Configuration Menu: 1RU/2RU
 - Allowed Card Types
 - Slot Limitations
 - Adjacent Pair Guidelines
 - Cards Description



- IP-20 G & GX & F
- IP-20C & IP-20C-HP
- IP-20E
- IP-20V
- NMS HW Inventory

8. Discovering of Network Elements

- Preparation of Discovering
 - SNMP setting on NE's
 - Connection Template
- Discover Settings and Discover NE
 - Discover perspective
 - Discover Settings
 - Managing NEs

9. Fault Management

- Network Alarm Status
- Alarms Colors
- Active Alarms
- Historical Alarms
- Alarm Summary
- Alarm Workflow Perspective
- Alarm Templates
- Alarm Templates Assignment
- Alarm Notifications
- Reconcile Alarms menu item
- Alarm to Service Correlation

10. Software & Configuration Management

- **Software Management Via EMS & NMS:**
 - Software Download
 - HTTP Transfer
 - FTP Transfer
 - Timed Installation
 - RFU Software Installation
 - NetMaster SW Inventory & SW Download Jobs
- **Configuration Management Via EMS & NMS:**
 - Backup and Restore
 - Unit Information file: Creation and Upload
 - NetMaster Configuration File Management
 - Connection Template
 - Open SNMP
 - CLI Broadcast

11. Activation Keys and Activation Management System

- Licensing in General



- Default & Demo Activation key
- CeraOS Activation key concept
- IP-20 Activation Key Scheme
- Licensed Features

12. End to End Services / IP20 Service Model

- IP-20 Services Capabilities
- Native TDM Services
- Hybrid Service Engine – TDM + Ethernet
- All-packet services example: Ethernet EVCs + TDM Pseudowire
- Service Model in General
 - What is a Service?
 - What is a Service point?
- Services in IP-20 Family & Services attributes
 - Point to Point Service (P2P)
 - Multipoint Service (MP)
 - Management Service
 - Point to Multipoint Service
- Service Point in IP-20 Family Service Access Point (SAP)
 - Service Network Point (SNP)
 - Pipe Service Point
 - Management Service Point
- Service Points classification and attributes
- Examples for Services and Service points
- Service Actions
- Ethernet Service
- TDM Service

13. IP20 Service Model/ P2P MP Service Creation

- Creating a Point-to-Point service
- Creating a Multipoint service

14. Performance Management

- Current Performance
- Historical Performance
- Performance Templates
- Performance Collection Control
- Radio Counters
- Radio Signal Level
- Radio Aggregate
- Radio MSE
- Radio MRMC
- Radio Traffic
 - Capacity
 - Throughput
 - Utilization



- Frame error rate
- Header Compression counters
- Ethernet PM & Statistics
 - RMON
 - Port TX
 - Port RX

15. Reports

- Alarm Frequency Report grouped by Network Element
- Alarm Frequency Report List
- Network Element Types Overview
- Inventory Report
- Performance Overview Report
- Performance Details Report
- Schedule Report

16. Northbound Interface

- Northbound SNMP Settings view
- HLM configuration for SNMP Agent
- HLM for Unmodified Trap Forwarding
- SNMP Agent

17. Security Management

- User Management Perspective
- Group Administration View
- User Administration View
- Audit Log View
- Radius Server

18. IP-20 Tier1 Troubleshooting

- Introduction/Type of faults
- Radio link diagrams
 - Basic Diagram of Telecom site
 - All outdoor
 - Hybrid solutions (Using All outdoor and add IDU for transport TDM traffic)
 - Multiband All Outdoor Configuration
 - Split mount
 - All indoor
 - New Generation Split/All indoor
- Causes of Radio Link Failure
- Alarm LED description
 - All Outdoor
 - Split & All Indoor
- Faults and Internal Alarms
- Radio - Performance Monitoring
- Performance Monitoring Ethernet Services
 - RMON
- Performance Monitoring TDM services
- Loopbacks



- Troubleshooting Diagrams
 - Troubleshooting Procedure
 - Hardware/RF Issues
 - Fading
 - Interference
 - External Interference
 - Looping
- Troubleshooting a Link
 - New Link
 - Checklist
 - Examples
 - Existing Link
 - Description
 - Examples
 - Critical Alarms Analysis
- Tier 1 Alarm Analysis and Report

19. Preventive Maintenance

- Introduction
- Maintenance Program
- Activities Prior to the On-site Visit
- Safety first
- Activities Description
 - Physical verification
 - Tower and Mast
 - Antenna and feeders
 - RFU
 - Coaxial Cable
 - Flexible Waveguide
 - Elliptical Waveguide
 - Dehydrator
- Equipment Verification
 - RSL
 - Alarms
 - Event Log
 - Configuration (Correct Time and Date)
 - Rectifier and Batteries
- Maintenance Protocol
- Activities after maintenance

20. Course Evaluation & Feedback



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Dear Customer,

We would appreciate your efforts in reviewing and confirming the enclosed detailed information regarding the course agenda, learning objectives and setup requirements, prior to conducting the course.

Should you require further information, please do not hesitate to contact us.

Thank you in advance for your cooperation,

Ceragon Training Services.

About Ceragon

Ceragon Networks Ltd. is the world's #1 wireless backhaul specialist. We help operators and other service providers worldwide increase operational efficiency and enhance end customers' quality of experience with innovative wireless backhaul solutions. Our customers include wireless service providers, public safety organizations, government agencies and utility companies, which use our solutions to deliver 4G, mission-critical multimedia services and other applications at high reliability and speed. Ceragon's unique multicore technology provides a highly reliable, high-capacity 4G wireless backhaul with minimal use of spectrum, power and other resources. It enables increased productivity, as well as simple and quick network modernization. We deliver a range of professional services that ensure efficient network rollout and optimization to achieve the highest value for our customers. Our solutions are deployed by more than 460 service providers, as well as hundreds of private network owners, in more than 130 countries.

