Network Operation Competence Development Solution
Training Catalog
（Transmission）

HUAWEI
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1 Network Operation Competence Development Training Solution

1.1 Background Introduction (Optional)

1.2 Network Operation Competence Development Solution Training Path

1. Transmission Training Path

![Diagram of Transmission Training Path]

- **Telecom Basic Training**
  - Transmission Overview: 0.5D
  - SDH Fundamental: 1D
  - WDM Fundamental: 1D
  - Microwave Fundamental: 0.5D
  - Ethernet Fundamental: 1.5D
  - OTN Fundamental: 0.5D
  - Hybrid MSTP Fundamental: 1.5D
  - ASON Fundamental: 0.5D
  - Synchronization Fundamental: 0.5D

- **Front Office Engineer Training**
  - Product Basic: 1.5D
  - Protection Basic: 2D
  - U2000 System Overview: 0.5D
  - Alarm Monitoring: 1.5D
  - Preventive Maintenance: 1.5D

- **Back Office Engineer Training**
  - Equipment Commissioning and Acceptance: 3D
  - Equipment Feature: 9.5D
  - U2000 Feature: 1.5D
  - Network Data Configuration: 11.5D
  - Troubleshooting: 2.5D
  - Assessment and Optimization (Optional): 5.5D
  - Expansion and Reconstruction (Optional): 6D
  - Planning and Design (Optional): 4D
## 2 Network Operation Competence Development Solution

### Training Programs

<table>
<thead>
<tr>
<th>Training Programs</th>
<th>Level</th>
<th>Duration (working days)</th>
<th>Training Location</th>
<th>Class Size</th>
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<tr>
<td>Transmission Training Programs</td>
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<tr>
<td>Telecom Basis Training</td>
<td>II</td>
<td>7.5</td>
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<td>6 ~ 12</td>
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<tr>
<td>Front Office Engineer Training</td>
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<tr>
<td>Back Office Engineer Training</td>
<td>III</td>
<td>43.5</td>
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## 2.1 Transmission Training Programs

### 2.1.1 Telecom Basis Training

#### Training Path

<table>
<thead>
<tr>
<th>Course</th>
<th>Type</th>
<th>Duration</th>
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<tbody>
<tr>
<td>Transmission Overview</td>
<td>Lecture</td>
<td>0.5d</td>
</tr>
<tr>
<td>SDH Fundamental</td>
<td>Lecture</td>
<td>1d</td>
</tr>
<tr>
<td>WDM Fundamental</td>
<td>Lecture</td>
<td>1d</td>
</tr>
<tr>
<td>Microwave Fundamental</td>
<td>Lecture</td>
<td>0.5d</td>
</tr>
<tr>
<td>Ethernet Fundamental</td>
<td>Lecture</td>
<td>1.5d</td>
</tr>
<tr>
<td>OTN Fundamental</td>
<td>Lecture</td>
<td>0.5d</td>
</tr>
<tr>
<td>Hybrid MSTP Fundamental</td>
<td>Lecture</td>
<td>1.5d</td>
</tr>
<tr>
<td>ASON Fundamental</td>
<td>Lecture</td>
<td>0.5d</td>
</tr>
<tr>
<td>Synchronization Fundamental</td>
<td>Lecture</td>
<td>0.5d</td>
</tr>
</tbody>
</table>

#### Target Audience
- Transmission Field Technician, First Line Operation and Maintenance Technician and Engineer

#### Prerequisites
- Basic knowledge of communications
- Having a general knowledge of data telecommunications

#### Objectives
On completion of this program, the participants will be able to:
- Outline the Transmission network structure and main functions of entities
- Describe the key features and technologies for SDH/WDM/Microwave/OTN/Ethernet/Hybrid MSTP/ASON/Synchronization system
- Describe the structure of the SDH frame
- Describe the function module and network structure of WDM system
- Explain the function and applications of different types Ethernet service
- Describe the networking characters of ASON
- Describe the basic concepts of OptiX Hybrid MSTP
- Describe the concept and characters of digital microwave communication
- Describe OTN frame structure, maintenance signals and function for different layers
- Outline the typical PWE3 encapsulation format for Ethernet
- Describe the networking characters of ASON
- Describe the types of Synchronization

#### Training Content
- Transmission Fundamental
  - Transmission technologies Overview
- SDH Fundamental
- SDH Overview
- Frame Structure & Multiplexing Methods
- Overheads & Pointers
- mechanism of the pointer

WDM Fundamental
- WDM Overview
- Transmission Media
- Key Technologies
- Technical Specifications

Microwave Fundamental
- Concept and characters of digital microwave communication
- Theory and function of every part in the digital microwave system
- Networking application for digital microwave system
- Fadings in microwave propagation
- Common technologies of antifading

Ethernet Fundamental
- Categories of Ethernet
- Basic Principle of Ethernet
- Ethernet Port Technology
- VLAN Basis & L2 Switching
- Data Traffic Basis
- Brief Introduction of Network and Internet
- Protocol and Standard
- Basic Architecture of IP Network

OTN Fundamental
- Optical transport hierarchy
- OTN interface structure
- Multiplexing/mapping principles and bit rates
- Overhead description
- Maintenance signals and function for different layers
- Alarm and performance events

Hybrid MSTP Fundamental
- MPLS Overview
- MPLS LSP Introduction
- MPLS-TP Introduction
- MPLS Tunnel Network Application
- QinQ Overview
- PWE3 Overview
- Hybrid MSTP Networking

ASON Fundamental
- Background of ASON
- System Structure of ASON
- Networking Characters of ASON
- Service Characters of ASON
- ASON Network Functions

Synchronization Fundamental
- Concept and characters of Synchronization
- Type of Synchronization
- 1588V2 Clock

Duration
- 7.5 working days

Class Size
- Min 6, max 12
2.1.2 Front Office Engineer Training

Training Path

- **Telecom Basis Training**
  - Prerequisites
  - Product Basic
    - Lecture 1.5d
  - Protection Basic
    - Lecture 2d
  - U2000 System Overview
    - Lecture, Hands-on exercise 0.5d
  - Alarm Monitoring
    - Lecture, Hands-on exercise 1.5d
  - Preventive Maintenance
    - Lecture, Hands-on exercise 1.5d

Target Audience

- Transmission Field Technician, First Line
- Operation and Maintenance Technician and Engineer

Prerequisites

- Successful completion of the following courses:
  - Telecom Basis Training

Objectives

- On completion of this program, the participants will be able to:
  - Outline the system structure and functions of the components of SDH/WDM/RTN
  - Describe the common SDH/WDM/RTN network topologies and their features.
  - Explain the protection mechanism of SDH/WDM/RTN
  - Browse and query the current alarms and performance in U2000 clients
  - Query the alarms and performance result by the setting conditions.
  - Describe the architecture and main features of U2000
  - Describe the directory structure of U2000
  - Describe the main functions of U2000
  - Know the operation environment of NMS
  - List the maintenance tasks
  - Perform the basic maintenance operations
  - Complete the maintenance records

Training Content

**Product Basic**

- System structure of SDH/WDM/RTN equipment
- Hardware structure of SDH/WDM/RTN equipment
- Main features of SDH/WDM/RTN equipment

**Protection Basic**

- Optical networking introduction
- Survivable networks introduction
- Types of protection
- Classification of topologies

**U2000 System Overview**

- Telecommunications Management Network Concept
- Network Management Layer of U2000
- U2000 System Architecture
- Interfaces of U2000
- Managed Equipment of U2000
- Hardware and Software Requirement
- The User Interface of U2000
- Processes of U2000
- NMS Maintenance Suite: MSuite
• License Introduction

Alarm Monitoring
• Alarm Severity and Category
• Alarm Status
• Alarm Viewing and Operations
• Alarm Template
• Alarm Setting Operations
• Alarm Dumping
• Performance Events Type
• Performance Monitoring Setting
• Performance Viewing Operations
• Performance Data Dumping

Preventive Maintenance
• Routine Maintenance for NMS
• Basic operation precautions
• Safety Precautions
• Routine Maintenance Operations for Network through NMS
• Browsing and Analyzing NE Alarms
• Browsing Performance

Duration
7 working days, 1 days hands-on exercise included.

Class Size
Min 6, max 12
2.1.3 Back Office Engineer Training

**Target Audience**
Transmission Field Technician, First Line, and Second Line Operation and Maintenance Technician and Engineer

**Prerequisites**
Successful completion of the following courses:
- Front Office Engineer Training

**Objectives**
On completion of this program, the participants will be able to:
- List the hardware function and main characteristics of SDH/WDM/RTN equipment
- Describe the mode and application scenarios of equipment commissioning
- Outline the procedure for commissioning of the SDH/WDM/RTN
- Describe the service configuration via U2000
- Explain key parameters in each step during data configuration procedure
- Locate and analyze the troubleshooting cases for SDH/WDM/RTN
- Describe the requirement of SDH/WDM network resource assessment
- Describe the methods about optimization
- Outline the process of OptiX WDM network expansion
- Outline the scenario of SDH network expansion and reconstruction
- List the procedure for designing the Hybrid MSTP and WDM network
- Perform the Hybrid MSTP and WDM network design

**Training Content**

- **Equipment Feature**
  - SDH/WDM/RTN Cabinet, Sub-rack, Boards
  - SDH/WDM/RTN Equipment Features
  - QoS Overview
  - QoS Technology
- MPLS-TP OAM
- MPLS OAM
- Basics Concepts of Clock Protection
- ECC Applications and Configurations
- Principle of IPA/APE/ALC
- Integrated IP Radio
- RTN 900 System control unit Introduction
- IF Multimode

Equipment Commissioning and Acceptance
- SDH/WDM/RTN Commissioning
- SDH/WDM/RTN Commissioning and Acceptance

U2000 Feature
- Network security management
- NMS user security management
- U2000 database management
- Service configuration methods
- Basic knowledge of the Veritas system
- Performing Veritas hot standby system

Network Data Configuration
- SDH(TDM) Data Configuration
- SDH(Packet) Data Configuration
- WDM Data Configuration
- RTN Data Configuration
- SDH(TDM) Data Adjusting
- SDH(Packet) Data Adjusting
- RTN Data Adjusting

Troubleshooting
- Fault Information Collecting
- Troubleshooting for SDH Fault
- Troubleshooting for WDM Fault
- Troubleshooting for RTN Faults
- Cases for troubleshooting

Assessment and Optimization (Optional)
- SDH/WDM network assessment overview
- Statistics on network resources
- Analysis of service requirements
- Assessment and analysis

Expansion and Reconstruction (Optional)
- Common operation method in SDH/WDM network expansion
- Common operation method in SDH/WDM network reconstruction

Planning and Design (Optional)
- Hybrid MSTP/WDM network design workflow
- Hybrid MSTP/WDM network design

Duration
43.5 working days, 12 days hands-on exercise included.

Class Size
Min 6, max 12